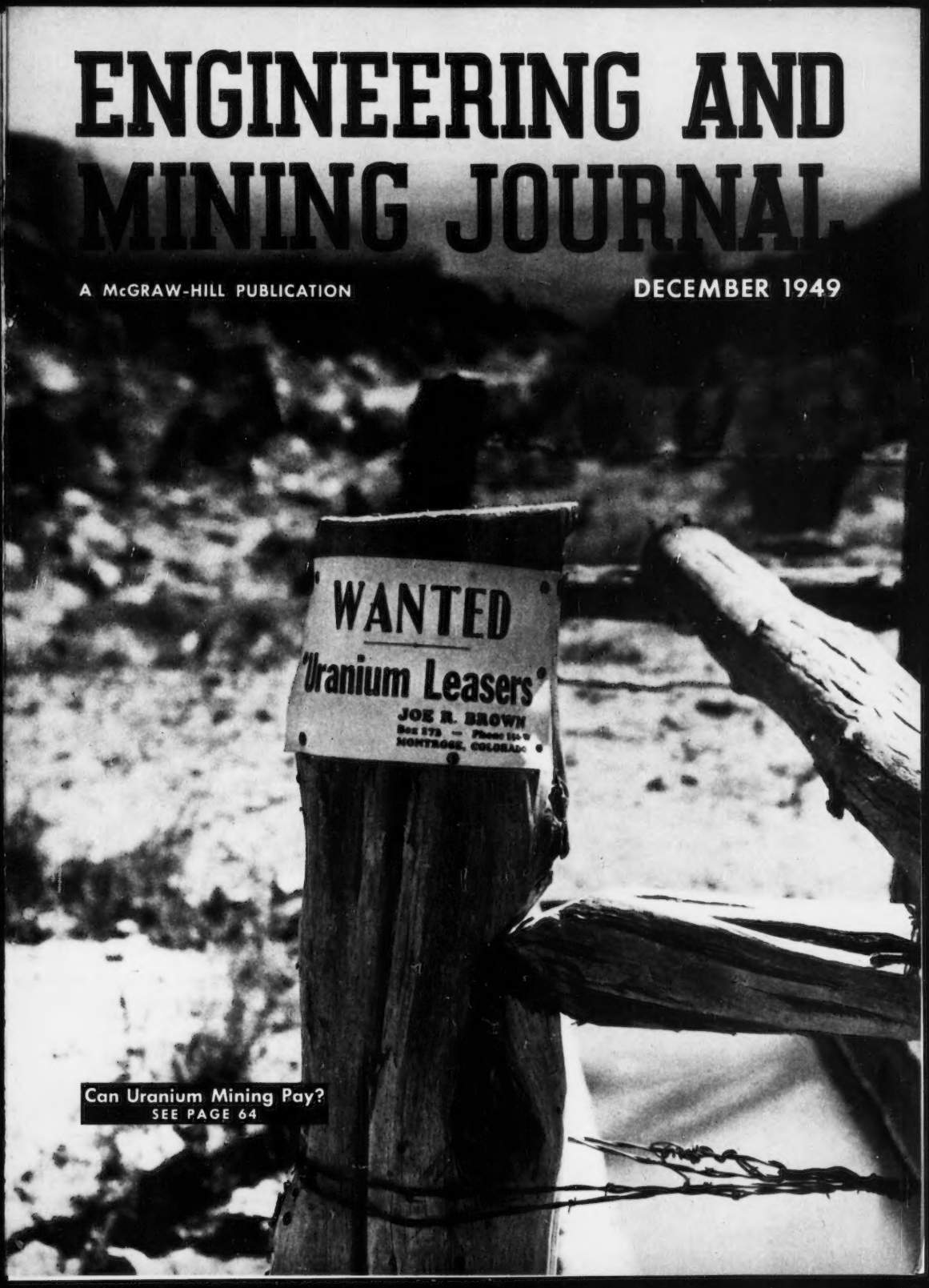
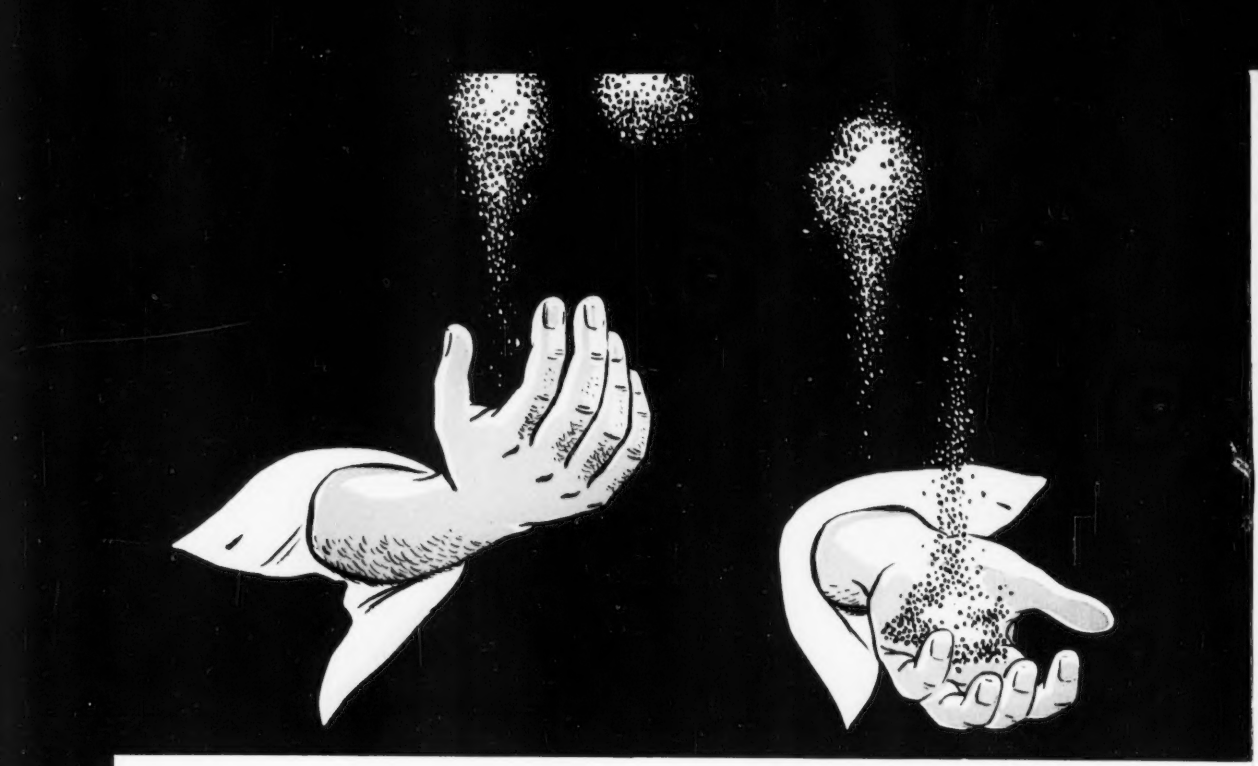
# ENGINEERING AND MINING JOURNAL

A McGRAW-HILL PUBLICATION

DECEMBER 1949




Can Uranium Mining Pay?
SEE PAGE 64



# CHANGEOVER TO HANDLE DIFFERENT MATERIALS OR TO DOUBLE PUMPING CAPACITY, EASY

When you buy a Hydroseal Pump of one type, metal or rubber lined, you really get the makings of three types. Any Maximix Rubber Lined Hydroseal Pump can be changed into an all metal Hydroseal Pump by simply changing the shell, impeller and suction sleeve, and vice versa for changing a metal pump to a rubber lined pump. Likewise, either type can easily be changed to a Rubber Lined Slurry Pump. . . . The pumping capacity of a B-Frame and a C-Frame Hydroseal (any type) can be doubled by simply changing a few parts. Thus, if your conditions change or if you want to use a Hydroseal for a service other than that for which it was purchased, changeover is easy and inexpensive. . . . This really means that there are actually a large number of standard types and sizes of Hydroseals, from 1½" to 14". Parts for all sizes are generally in stock, so upon receipt of an order, it's simply a matter of assembly and shipment. Send for Catalog 547, which includes tables showing H P and pump speeds for various capacities and heads. The Allen-Sherman-Hoff Co., 229 S. 15th Street, Philadelphia 2, Pa., U.S.A. Representatives in Most Principal Cities.

**HYDROSEAL** SAND, SLURRY & DREDGE PUMPS
MAXIMIX RUBBER PROTECTED

HYDROSEAL, PACKLESS AND MAXIMIX DESIGNS ARE COVERED BY PATENTS AND APPLICATIONS IN THE MAJOR MINING CENTERS OF THE WORLD

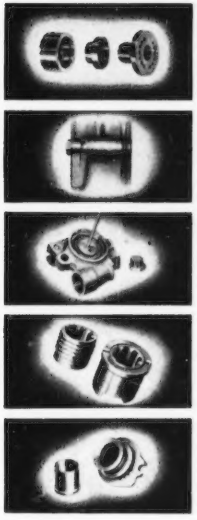
NO OTHER MIDDLEWEIGHT

# JACKHAMER

OFFERS YOU ALL OF THESE

# HEAVY-DUTY FEATURES

THE J-40



**A DOUBLE-KICKER PORT VALVE** that allows full air pressure on the piston for a longer period of time, resulting in more powerful blows and stronger rotation.

**AN IMPROVED BLOWING ACTION** that puts air at full line pressure directly into the chuck cavity for better hole blowing.

**A THREE-IN-ONE BACKHEAD** that permits a quick changeover to wet, dry or blower type drilling.

**A BRONZE CHUCK-NUT** that cuts replacement costs and prolongs piston life.

**A BUSHED PISTON-STEM BEARING** that reduces piston wear, lowers maintenance costs and maintains an air cushion at the front end of the drill.

*The Jackhamer designed with the Carset Jackbit in mind*

CARSET JACKBIT

SET WITH CARBOLOY INSERTS

These features, plus light weight and easy holding, make the J-40 the most powerful — and the most **versatile** Jackhamer in its class. It's light enough for the widest range of general work, and powerful enough to handle many of your **BIG** jobs, too. Ask your nearest I-R office for a demonstration.

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ROCK DRILLS • COMPRESSORS • AIR TOOLS • DIESEL AND GAS ENGINES • CENTRIFUGAL PUMPS • VACUUM EQUIPMENT

# This hose resists water absorption—lasts up to 100% longer

***"Wet strength" cord adds years of life to B.F. Goodrich water hose***

B. F. GOODRICH water hose is made with rubber compounds that make it highly resistant to water absorption, swelling, carcass damage.

In accelerated laboratory tests B. F. Goodrich water hose absorbed less than half as much water as other brands tested. This means longer hose life, because water can diffuse through to the carcass to cause mildew and mold.

All types of B. F. Goodrich water hose have this longer-lived compound. And all types have "wet strength" cord —specially treated long-staple cotton that actually becomes *stronger* when wetted (where synthetic fibers weaken).

***Tubes***—All grades and types of B. F. Goodrich water hose are fortified with Agerite, the chemical that makes rubber last longer. Most BFG water hose stands hot water; some—creamery hose for example—even take low pressure steam. Specially compounded tubes available to stand water contaminated with acids and other chemicals.

***Covers***—You can drag B. F. Goodrich water hose over wet concrete floors, dirt and cinder yards, use it on highways where it gets run over. It's compounded to take severe abrasion, to resist cutting and gouging. Some covers are compounded to stand oils and greases. Can be made with rubber-capped ends, that protect the carcass from moisture wicking in. Built-in nozzles and tapered ends can be dropped anywhere without doing damage.

If you use water hose don't be satisfied without knowing what developments BFG may have made in hose for your particular type of service. To make sure you get the longest life from water hose, see your local BFG distributor. *The B. F. Goodrich Company, Industrial and General Products Division, Akron, Ohio.*

*Water Hose* BY

**B.F. Goodrich**

# ENGINEERING AND MINING JOURNAL

FOUNDED 1866

VOLUME 150 — DECEMBER, 1949 — NUMBER 12

E & M J Outlook . . . . . 59

Market Summary . . . . . 60

Behind the By-Lines . . . . . 62

Editorial . . . . . 63

Can Uranium Mining Pay? . . . . . A. W. KNOERR 64

Could the Treasury Raise Its Gold Price Overnight? . . . HERBERT W. BRATTER 72

Refractories Cost Money Too . . . . . 74

Mining Labor Relations Give No Cause For Pride . . . . JAMES K. RICHARDSON 78

Better Way to Treat Parkes Process Crusts . . . A. W. SCHLECHTEN, C. H. SHIH 80

South Agnew Skip Hoist Is Remote-Controlled . . . . . 82

Crushing Plant Design—Part II . . . . . L. M. ANDERSEN 85

Keeping Tab on Practice . . . . . 88

Washington Reflections . . . . . 90

News of the Industry . . . . . 92

Operating Ideas . . . . . 94

Equipment News . . . . . 100

Personal News . . . . . 106

Regional News . . . . . 114

New Books . . . . . 140

**Index for 1949 Volume Faces Page 142**

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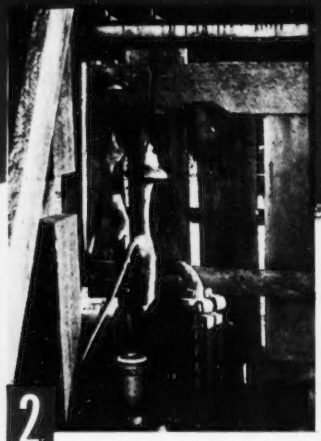
# 5 GOOD WAYS TO INSTALL SHAFT OR BOREHOLE CABLE

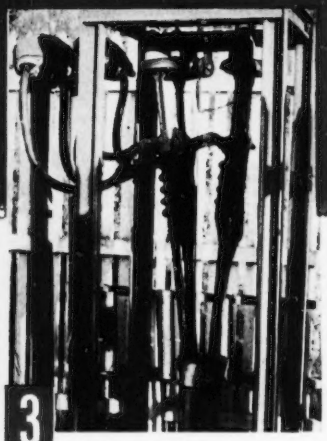
1

**LIGHT-WEIGHT ALUMINUM BOREHOLE CABLE** suspended by strain insulators clamped to conductors. This 5KV cable with ground wires is 3/c 350,000 CM with Hazard long-lived, high voltage Keystone oil-base insulation and an overall covering of a tough, moisture, flame, and weather-resistant Hazaprene ZBF Sheath. Borehole is 700 feet deep and carries a 2,300 volt a-c circuit to an underground rectifier station. Cable length is 1050 ft. from outside power line to underground station.



2

**CONCENTRIC SHAFT-CABLE INSTALLATION** 250-volt, d-c, 1,000,000 CM concentric cable suspended in conduit in shaft by means of I beams installed over shaft opening. Concentric conductor clamped, with copper strands bent back and refastened over clamp. Two 350,000 CM, 250-volt d-c cables also installed in shaft in conduit. These cables are supported from steel beams by strain insulators and clamps to conductors. All insulation is 600-volt Watertite with a protective sheath of Hazaprene ZBF.

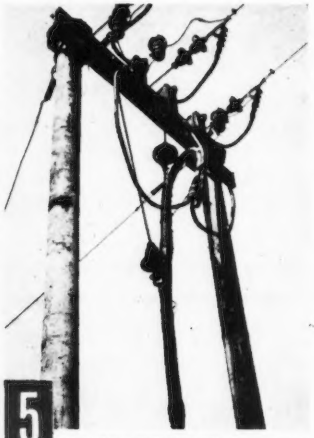


3

**4 CABLE INSTALLATION** suspended from simple steel structure. Each cable is 500,000 CM, carries 550 volts d-c with two positives and two negatives. Conductors have Hazard moisture-resistant, 1000-volt, Watertite insulation. Unequalled outside protection against moisture, flame, acids and mechanical damage is provided by tough Hazaprene ZBF Sheath. Borehole is 500 feet deep with cables held by strain insulators and strain clamps on conductors.

4

**SIX D-C FEEDER CABLES** installed in a 600-foot borehole. Each cable is 250,000 CM, with 600-volt Watertite insulation and a tough Hazaprene ZBF Sheath. A strain insulator with clamp connected to the conductor supports these cables individually from simple steel structure.



5

**4100 VOLT TRANSMISSION LINE** to underground pumping stations and power-conversion stations for d-c haulage and mining equipment. Cable is a 3/c, 4/0, 5000-volt Hazard Borehole cable with long-lived Keystone oil-base insulation protected over-all by a Hazaprene ZBF Sheath. Suspension is accomplished by two strain insulators and Kellems grips.

**HAZARD MINE POWER CABLES ENGINEERED FOR BOREHOLE USE GIVE YOU A DIRECT, TROUBLE-FREE, ECONOMICAL CIRCUIT TO UNDERGROUND WORKINGS**

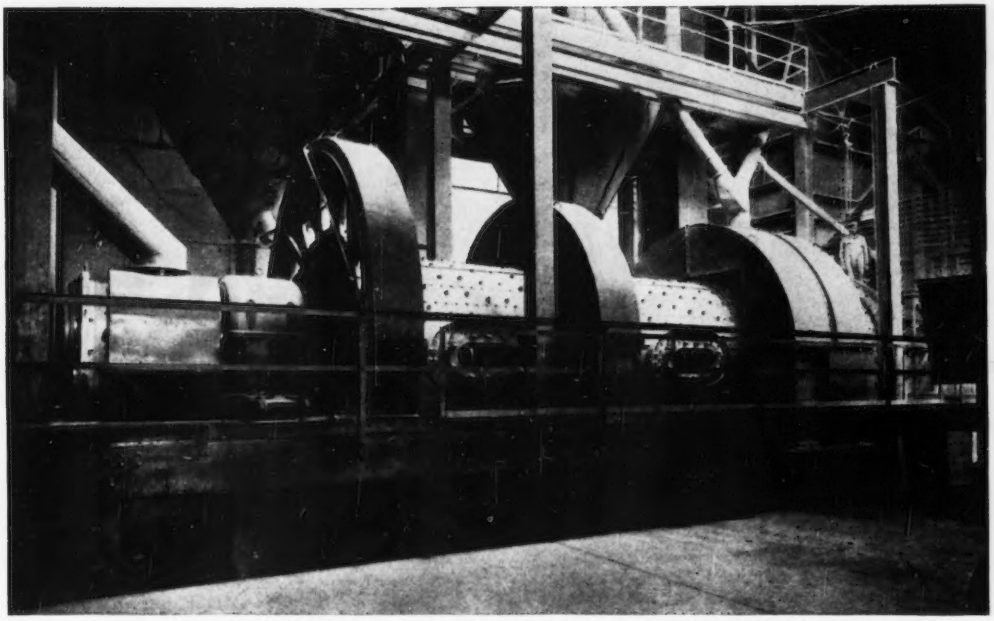
THERE are many good ways to install borehole or shaft cable, and on this page are shown some typical methods that have proved successful.

Of vital importance, of course, to any borehole or shaft installation is the design and construction of the cable used. And there is a wealth of first-hand experience in the selection of mine power cables readily available to you. Over the years, much Hazard research and engineering has been devoted to developing specialized mining cables—in cooperation with mining engineers — that simplify installation problems and costs . . . that assure long, trouble-free service.

An experienced Hazard engineer will be glad to discuss your own particular operating requirements with you. Hazard Insulated Wire Works, Division of The Okonite Company, Passaic, N. J.

7725

HAZARD insulated wires and cables for every mining use



# Grinds 6,000,000 Tons in 19 Years: 16-20 Hours a Day

TAKES REAL TOUGHNESS to stand a long grind like this. Yet, after 19 years, this 9½ ft diameter, 3-compartment dry grinding *Compeb* mill is still going strong for a large cement company.

On the job 16 to 20 hours a day, this Allis-Chalmers mill reduces limestone and shale to a specification raw mix for a rotary cement kiln. Aside from routine liner and grinding media replacement, the mill has required only *one major repair*, a pinion and pinion shaft.

**CHECK THESE STRENGTH FEATURES**

Strength and stamina are built into every part of Allis-Chalmers *Compeb* mills.

- Bearings, for example, are extra large and equipped with flood lubrication . . . your assurance of low bearing pressure, long life.
- Mill shells are of all-welded construction, "stress-relieved" after welding to minimize strains.
- Mill heads are designed for maximum strength per pound of metal used.

**CHOOSE FROM 5 MILL TYPES**

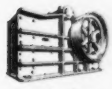
When you specify Allis-Chalmers for grinding mills you'll get a mill that's *well-suited to your specific grinding job*. A-C builds five separate types of grinding mills in a maximum range of sizes . . . with overflow, diaphragm grate or special discharge modifications . . . with feeder and drive to suit your mill size and application.

For sound advice on your grinding problems — based on A-C's experience in building *over 4,000* mills—call your nearby A-C representative. Offices or distributors in principal cities in the U.S. and throughout the world.

Compeb is an Allis-Chalmers trademark.

A2672

Kilns, Coolers, Dryers


Jaw Crushers

Hoists

Mills

Gyratory Crushers

Vibrating Screens

AND OTHER EQUIPMENT FOR THE CRUSHING, CEMENT AND MINING INDUSTRIES

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# ALLIS-CHALMERS

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# ON AIR

## Select your lubricants according to your operating conditions . . . from Texaco's complete line.

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There are Texaco air compressor oils for all operating conditions . . . all designed to keep valves clean, rings free, ports open and air lines clear . . . to reduce wear and bring your maintenance costs down.

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*More copper mining equipment in the U. S. is lubricated with Texaco than with any other brand.*

A Texaco Lubrication Engineer will gladly help you select the right lubricants to assure the greatest efficiency and economy from all your machinery. Just call the nearest of the more than 2300 Texaco Wholesale Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

TEXACO STAR THEATRE presents MILTON BERLE on television every Tuesday night. METROPOLITAN OPERA broadcasts every Saturday afternoon.

TEXACO

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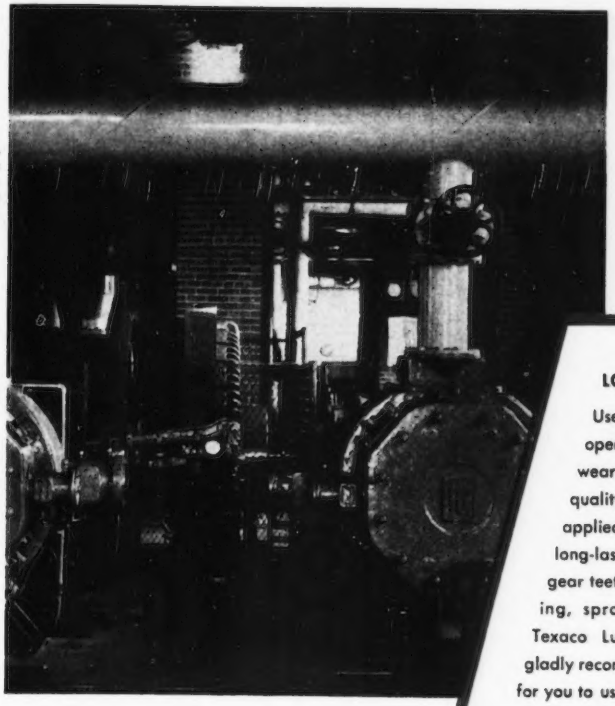
# COMPRESSOR EFFICIENCY

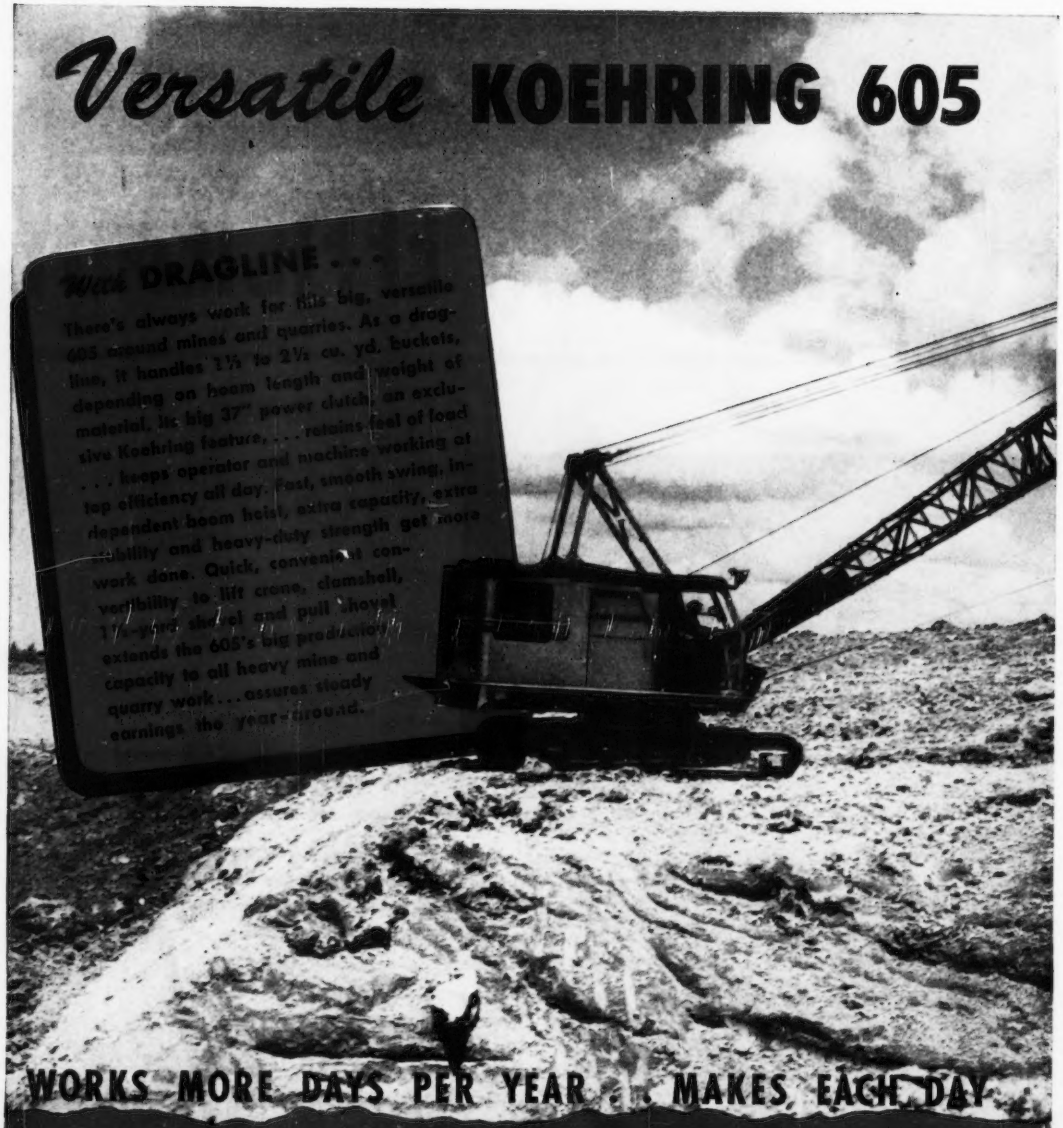


**LONGER LIFE FOR OPEN GEARS**

Use *Texaco Crater X Fluid* on your open gears and they'll last longer, wear less, run more quietly. This top quality lubricant is a liquid when applied, but quickly forms a tough, long-lasting film that guards your gear teeth. Easily applied by brushing, spraying or pouring. Your Texaco Lubrication Engineer will gladly recommend the proper grade for you to use.

## Lubricants and Fuels
FOR THE MINING INDUSTRY

# Versatile KOEHRING 605


With DRAGLINE . . .
There's always work for this big, versatile 605 around mines and quarries. As a dragline, it handles 1½ to 2½ cu. yd. buckets, depending on boom length and weight of material. Its big 37" power clutch, an exclusive Koehring feature, . . . retains feel of load . . . keeps operator and machine working at top efficiency all day. Fast, smooth swing, independent boom hoist, extra capacity, extra stability and heavy-duty strength get more work done. Quick, convenient convertibility to lift crane, clamshell, 1½-yd. shovel and pull shovel extends the 605's big production capacity to all heavy mine and quarry work . . . assures steady earnings the year-round.

WORKS MORE DAYS PER YEAR . . . MAKES EACH DAY . . .

*Here's why . . .*

- Quick convertibility to dragline, lift crane, clamshell, shovel and pull shovel means more work days, no "off-season" hold-ups.
- Big 37" power clutch cuts normal lever pull 70% . . . retains load feel . . . cuts operator fatigue, steps up output with every attachment.
- Swing is smooth, because light spiders inside band clutches, not heavy drums, are accelerated . . . rotate cool-running finned drums.

**KOEHRING COMPANY**
Milwaukee 10, Wisconsin
*Subsidiaries:* JOHNSON
PARSONS • KWIK-MIX

# KEEPS BUSY YEAR-AROUND

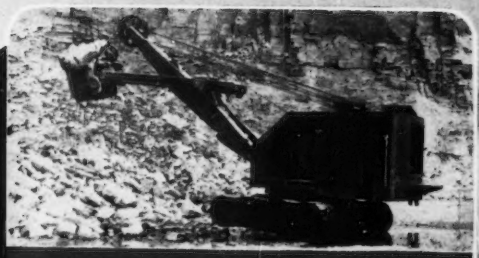
## MORE PRODUCTIVE . . .

Moves, steers, stops, holds with positive friction-brake steering. Steers with turntable in any position. Result: extra maneuverability.

High-quality, heavy-duty construction . . . simple, accessible machinery . . . assure steady production daily, on every application.

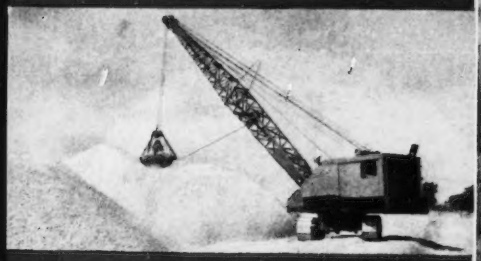
KOEHRING HEAVY DUTY

Koehring Excavators are available in a complete range of sizes: ½-yd. 205, ¾-yd. 304; 1½-yd. 605, and new 2½-yd. 1005. For complete facts see your Koehring distributor . . . or write to him for bulletins.



**TA-TD, SHOVEL or PULL SHOVEL . . .**

For your heaviest excavation, 605 with 1½-yard dipper, has rugged rock boom of right-welded box design, reinforced on wearing, shock-absorbing base . . . Ultrasteels balanced with a cast section of hydraulic-duty durability. Can also be used with 1½-yard pull shovel during "off-season" for extra earnings . . . digs depths 23' below tracks . . . up to 34' wide cuts . . . 44½' digging reach for wide work range.



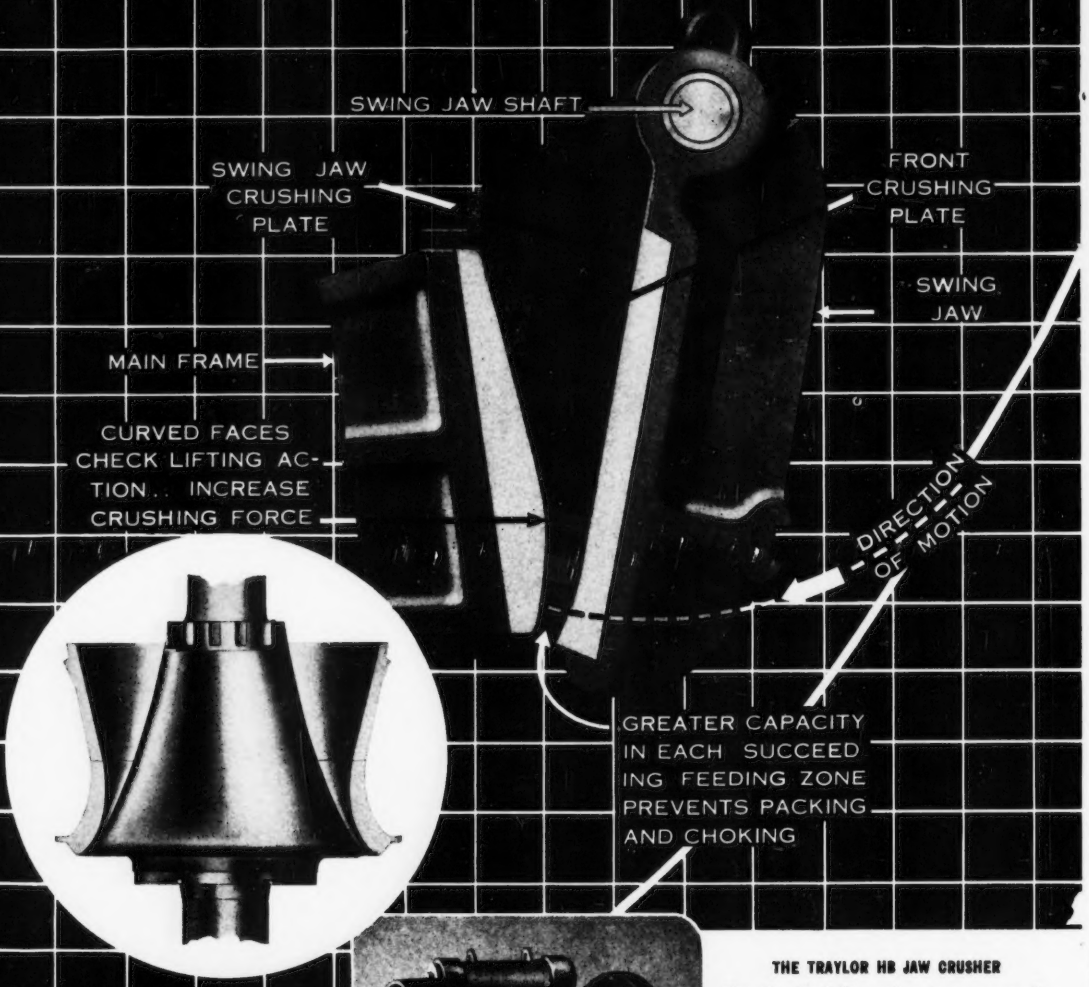
**LIFT CRANE OR CLAMSHELL . . .**

When not in use as an excavator, the big 605 with crane attachment handles heavy lifts up to 20 tons. Power-boom lowering available. Koehring 605 also provides you with high-speed clamshell operation for stockpiling and other bulk material handling. There's no end to the jobs this all-modern, fully-convertible excavator can handle around your property. Speed in every operation gets work done.

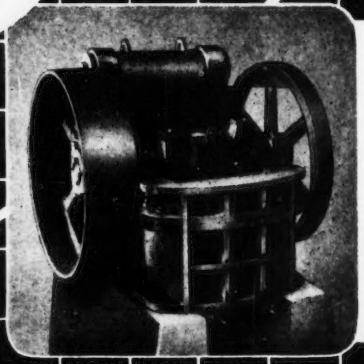
**DUMPTORS®** . . . for fast-paced, high-production excavating and hauling, team up Koehring excavators with 4-yard Dumptors. You get 5-speeds forward and reverse for fast, nonstop shuttle haul . . . 6 lbs. per ton of gross vehicle weight for sweeping, efficient hauling . . . plenty of power to pull up grades to 24% fully loaded. And, too, about bigger, new 12-yard Koehring Dumptor® for hauls over 5,000 yards.

®Trademark Reg. U. S. Pat. Off. K826

# REDUCE COSTS . . . NIP BIGGER PROFITS


SWING JAW SHAFT
SWING JAW CRUSHING PLATE
FRONT CRUSHING PLATE
SWING JAW
MAIN FRAME
CURVED FACES CHECK LIFTING ACTION.. INCREASE CRUSHING FORCE
DIRECTION OF MOTION
GREATER CAPACITY IN EACH SUCCEEDING FEEDING ZONE PREVENTS PACKING AND CHOKING





**CURVED CRUSHING SURFACES SEND PRODUCTION CURVES SOARING**

**THE TRAYLOR HB JAW CRUSHER**

The Traylor HB crusher is an unusually modern and efficient breaker. Besides the Traylor patented curved jaws that alone add greatly to its crushing efficiency and profits, the Traylor HB features: A Traylor safety device that eliminates the possibility of breaking any important part of the crusher, a scientifically reinforced welded steel plate frame that permits easy inspection and facilitates repairs, a rod type pitman of known strength. Sizes: 36 x 42 to 56 x 72. Write for Bulletin 3105.

WITH

# Traylor

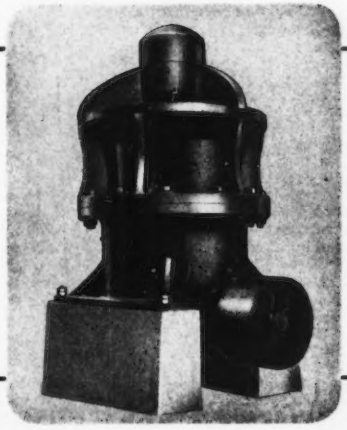
## Jaw and Reduction CRUSHERS

The smooth-faced curved jaw plates of all Traylor jaw crushers employ the same non-choking principle famous in the Bell Heads and Curved Concaves of Traylor reduction crushers. A more efficient application of crushing force in the crushing zone increases production and secures a finer, more uniform product with a lower power-per-ton factor. With this combination of greater output, superior product and lower power costs, Traylor operators enjoy a distinct competitive advantage.

### Traylor Engineering Pays Off In Profits

Before you buy a crusher, it will pay you to investigate the profit-making advantages that Traylor's advanced engineering makes available in both jaw and reduction crushers for all crushing operations. Detailed, illustrated bulletins are available upon request. Why not write us today?

**TRAYLOR ENGINEERING & MANUFACTURING CO.**
**214 Mill Street, Allentown, Pa.**
*Sales Offices: New York, N.Y., Chicago, Ill., Los Angeles, Calif.*
**Canadian Mfr: Canadian Vickers, Ltd., Montreal, P.Q.**



**THE TRAYLOR TY REDUCTION CRUSHER**

Traylor TY's are profit makers in every detail. Exclusive self-tightening, non-chokable bell head and curved concaves produce greater tonnages of finer, more uniform product at lower cost. Traylor TY's feature an all cast steel frame with upper shell and spider cast in one piece, a superior dust seal and automatic force feed lubrication system. Compact, simple in design, easy and economical to operate, the Traylor TY is a profit-making reduction crusher of modern and advanced design throughout. Sizes 1'8" to 5'6". Write for Bulletin 5112.

Traylor

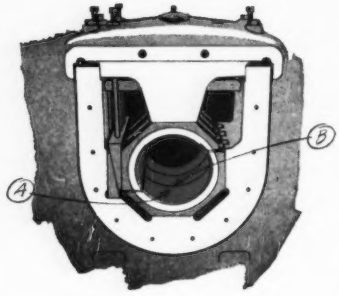
**JAW, REDUCTION AND GYRATORY CRUSHERS**

**FEEDERS · KILNS · COOLERS**
**DRYERS · GRINDING MILLS**

***A "Traylor" Leads to Greater Profits***

# STANDARD ENGINEER'S CASE FILE

## Case 1145—Cutting Lube Cost in General Equipment




AIR COMPRESSOR MAIN BEARING

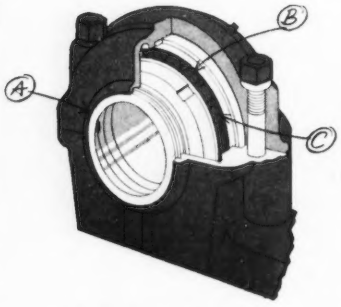
Calol Multi-Service Oils in air compressors decreased lubricant consumption as much as 20%. Highly efficient in many machines, including Diesel engines, pumps, enclosed reduction gears and their integral bearings. Come in six grades: 45X, 50X, 55X, 65X, 75X, 85X. Approximately SAE 10 to SAE 50.

A. Contain oxidation-resistant compounds ... prevent formation of varnish and lacquer on bearing surfaces, engine cylinders, pistons, etc.

B. Special compound assures lubrication at high temperatures — has inherent tendency to "run toward" hot surfaces .. spreads uniformly and rapidly.

Other additives in Calol Multi-Service Oils help remove lacquer and varnish from machine parts and keep them dispersed, and prevent excessive foaming of oil. May be used in all types of oiling systems.

## Case 1165—Keeping Grease in Bearings in Hot Conditions




HEAVY-DUTY ROLLER BEARING

Specialized Calol S.A. Grease did not leak from a heavily loaded industrial bearing on a factory machine when surrounding temperatures climbed to 250° F. Its heat resistance was also proved in a series of tests on the Navy Ball Bearing Machine, operated at 10,000 rpm with extremely high bearing temperatures. Adaptable to many services, but especially recommended for anti-friction bearings where radiated temperatures are high. Comes in three grades: Nos. 00, 0 and 1.

A. Very high melting point minimizes seepage through housings and seals.

B. Feeds evenly to all bearing surfaces.

C. Remains soft in cold temperatures — assures good pumpability and thorough lubrication.

To give Calol S.A. Grease unusual heat-resistant qualities, it is made from selected heat-resistant oils and a special sodium-aluminum soap base.

For additional information and the name of your nearest Distributor, write

**STANDARD OIL COMPANY OF CALIFORNIA**

225 Bush Street, San Francisco 20, California

**The California Oil Company**
Barber, New Jersey

**The California Company**
17th and Stout Streets, Denver 1, Colo.

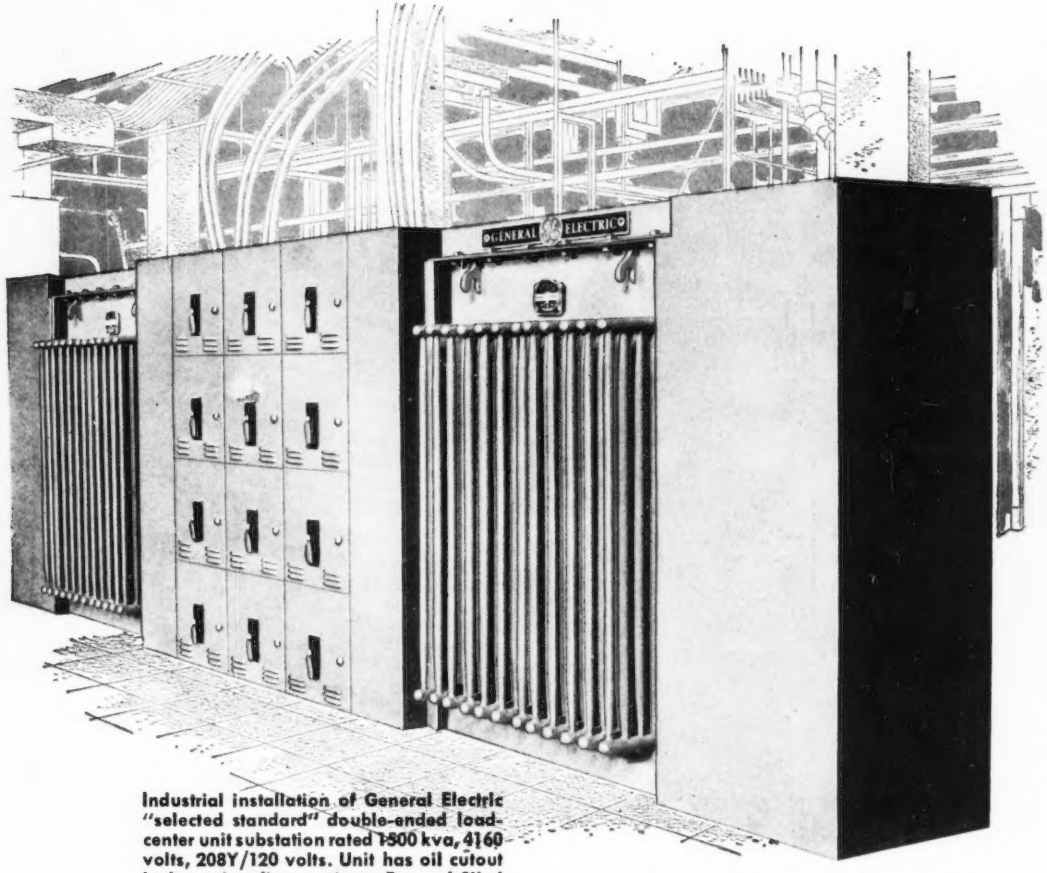
**Standard Oil Company of Texas**
El Paso, Texas

CALOL

Trademark Reg. U.S. Pat. Office

IF YOU HAVE A REAL ROCK SHOVEL you are equipped for output in any pit!
The Northwest Dual Independent Crowd utilizes force that every other independent crowd wastes! The Cushion Clutch eliminates the effects of shock overloads to parts under power and helps make ample power safer. The Northwest Welded Boom and Dipper Sticks have been proved in Rock work and are built for the hardest job a shovel has to do.
Cast Steel Machinery Bases and Cast Steel Machinery Side-Frames take the shocks of rock digging and maintain shaft alignment.
It's a real Rock Shovel and if you have a Real Rock Shovel you never have to worry about output at the heart of the job.
NORTHWEST ENGINEERING COMPANY
1509 Field Building
135 South LaSalle St.,
Chicago 3, Ill.
only the best for the heart of the job
MAKE YOUR KEY MACHINE A NORTHWEST CRAWLER CRANE for the heart of the job
PROFIT
NORTHWEST
Convertible for any Mining Material Handling or Excavation Problem

# new load center unit




**Industrial installation of General Electric "selected standard" double-ended load-center unit substation rated 1500 kva, 4160 volts, 208Y/120 volts. Unit has oil cutout in incoming line sections, Pyranol-filled transformers, and the new AK-1 air circuit breakers.**

★ *Be sure to see the "More Power to America" full-color sound slidefilm "Modern Industrial Power Distribution." Ask your G-E sales representative to arrange a showing for your organization.*

# substations

## •improved appearance

Note the smooth, integrated appearance of these new G-E Pyranol® unit substations . . . no more gawky, "old-type" bus-duct connections between transformer and switchgear . . . now you can get the effortless flow of line and power that characterizes quality equipment for locations where appearance is a requisite.

## •'selected standards'

Based on surveyed demands of industry and proposed NEMA specifications, "selected standard" ratings have been inaugurated to bring you these efficient new load centers on shorter shipment. The most popular "selected standard" ratings are:

Low voltage—480△, 208Y/120 volts
High voltage—2.4, 4.16, 4.8, 12, 13.2, 13.8 kv
Kva ratings—300, 500, 750, 1000, 1500, 2000

Certain other "selected standard" load centers are available. Contact your G-E sales representative for further information.

## •shorter shipments

By ordering "selected standards," you get really short shipments on Pyranol and dry-type load centers. Deliveries are in line with average plant construction schedules and it is suggested that load centers be ordered when construction begins.

## •high impulse levels

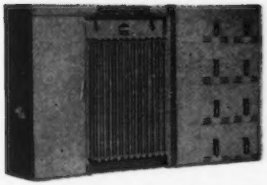
Pyranol unit substations with their inherently high impulse levels are particularly suitable for locations that are subject to switching surges and lightning.

Remember too, that G-E load-center power distribution is the most economical power distribution you can buy . . . no heavy, costly long-run feeders, no "piecemeal" purchases, no divided responsibility.

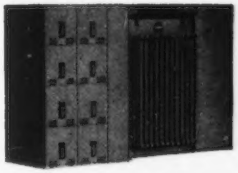
You'll save time too, because G-E "selected standard" load centers eliminate weeks spent over drawing boards detailing individual items; you'll save time because G-E factory-assembled unit substations are quickly and easily installed—in the center of the load area—with lower material and labor costs than required for "piecemeal" assemblies.

Ask your G-E sales representative *today* about how "selected standard" load centers can save time and money in your plant. Also, write for Bulletin GEA-3592.

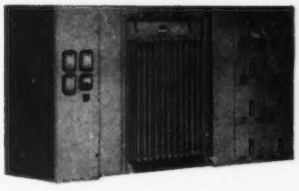
•*Apparatus Department, General Electric Company, Schenectady 5, New York.*



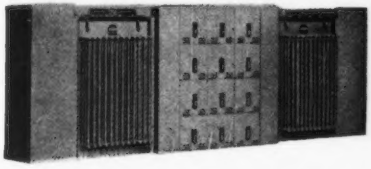
**Typical 500 kva G-E "selected standard" load-center unit substation (standard arrangement). Unit consists of primary interrupter switch, liquid-filled transforming section, and low-voltage feeder switching section with the new Type AK-1 drawout breakers.**



**Same as unit shown above but with reversed arrangement.**



**Typical 500 kva G-E "selected standard" load-center unit substation with liquid-filled transforming section, metal-clad air power circuit breaker for incoming line-protection, and low-voltage feeder switching section with the new Type AK-1 drawout breakers.**

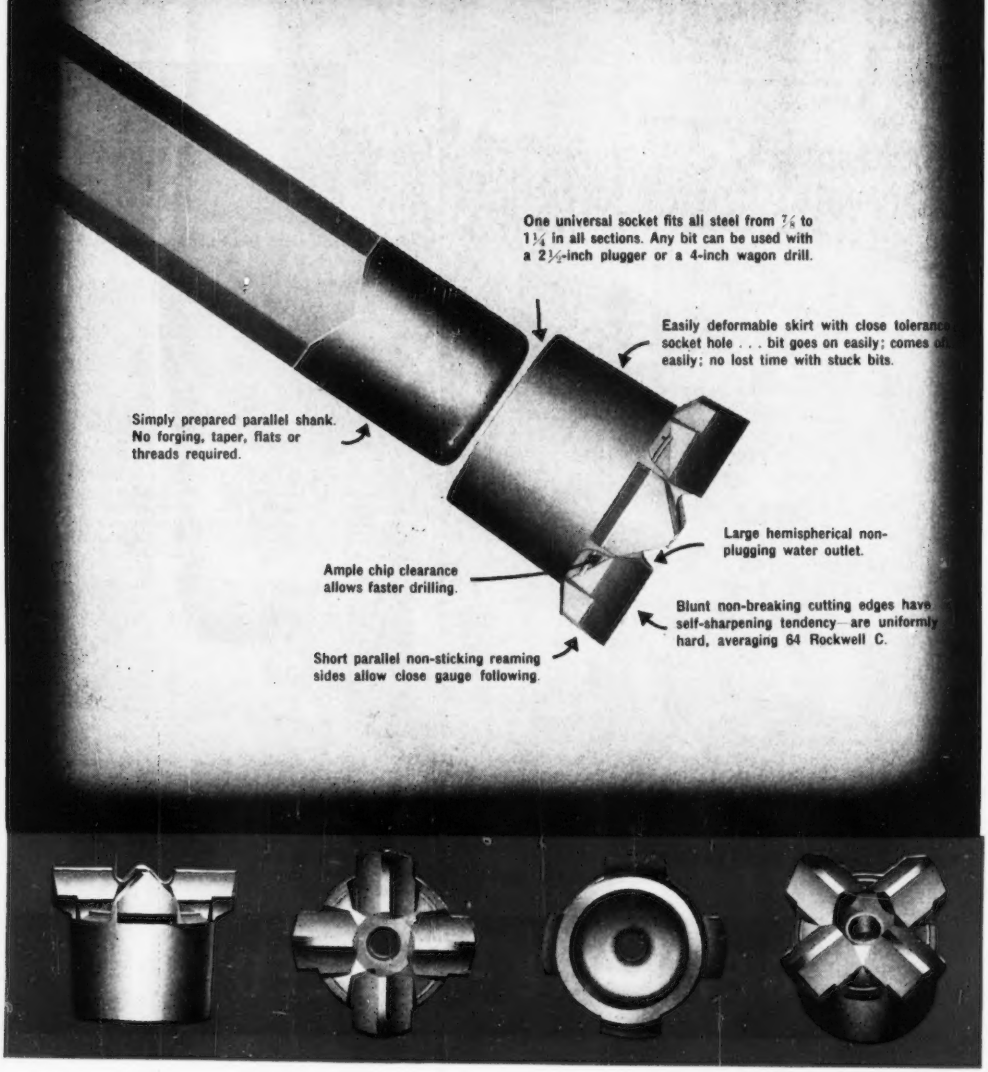


**G-E "selected standard" double-ended load-center unit substation rated 1500 kva with primary interrupter switches, liquid-filled transforming sections, and low-voltage feeder switching section with G-E Type AK-1 drawout air circuit breakers arranged for secondary selective service.**

GENERAL ELECTRIC

# THROWAWAY

## DETACHABLE ROCK BITS


One universal socket fits all steel from 7/8 to 1 1/4 in all sections. Any bit can be used with a 2 1/2-inch plugger or a 4-inch wagon drill.
Easily deformable skirt with close tolerance socket hole . . . bit goes on easily; comes off easily; no lost time with stuck bits.
Simply prepared parallel shank. No forging, taper, flats or threads required.
Large hemispherical non-plugging water outlet.
Ample chip clearance allows faster drilling.
Blunt non-breaking cutting edges have self-sharpening tendency—are uniformly hard, averaging 64 Rockwell C.
Short parallel non-sticking reaming sides allow close gauge following.

# Case History Number 2

**HIGHLAND-SURPRISE CONSOLIDATED MINING COMPANY**

GEARON BUILDING

WALLACE, IDAHO

MINE OFFICE:
STAR ROUTE KELLOGG, IDAHO

JUN 23 1948

Throwaway Bit Co.
4200 N. W. Yeon Ave.
Portland, Ore.

Gentlemen:

After testing your bits for several months, we have changed over our steel and are using them in all the Stopes and raises in the mine. We will probably use them thruout the mine as soon as liner steel can economically be changed over.

Drilling speed has been increased about 33%, powder usage has been appreciably reduced, steel breakage dropped about 30% and bit costs show a very substantial reduction.

We are very much pleased with your Throwaway Bit and the service rendered by your company. Some difficulty was experienced at first in removing the dull bits but this was soon overcome by the mines themselves so this is no longer a problem.

We can certainly recommend your Bit to any one as they have done a remarkable job for us in cutting one of our biggest items of cost.

With best of regards, we remain,

Yours very truly,
F. H. Mitchell
F. H. Mitchell, Mgr.

It is the company's policy to avoid grandiose, unsubstantiated claims and to offer results of actual production runs in well known mines, quarries and contracting projects as these become available. Furthermore, the company's metallurgical laboratory, backed by their field men, is constantly endeavoring to give the industry better, faster, further and easier drilling at lower cost per foot.

Fully descriptive literature is available and competent field engineers are always at your service.

**THROWAWAY BIT CORPORATION**

**4200 N.W. Yeon Ave. Portland, Oregon, U.S.A.**

*Throwaway Bits, methods of manufacture, etc., and the name Throwaway are covered by patents already issued, applications for patents, design patents, trademarks, etc. Any infringement will be prosecuted to the full.*

# Amsco-nagle

## MATERIALS HANDLING

# Pumps

1. Simple design—only three wearing parts.
2. Easy replacement of impeller, casing, and plate without disturbing bearing stand or drive.
3. Water end parts of austenitic manganese steel or ABK Metal, whichever is best suited for the particular job.
4. Stuffing box accessible from above or below.
5. Split bearing stand—easy to dismantle.
6. Initial high efficiency maintained with slippage seal adjustment.
7. Oversized, grease lubricated, deep-grooved ball bearings for long wear with minimum servicing.

*Amsco-nagle 6" Type "T" frame 19 pump for handling surplus sand at the Chillicothe, Ohio plant of Southern Ohio Quarries Company.*

## Good for BAD mixtures

No matter how abrasive the material to be pumped, or how laden with solids, there is an Amsco-nagle Pump for the job. In the pumping of slurries, coal fines, sand and gravel aggregates, sludge and similar materials, an Amsco-nagle will outpump and outwear ordinary equipment by a substantial margin. In many applications Amsco-nagle Pumps are performing with satisfaction where other pumps have failed.

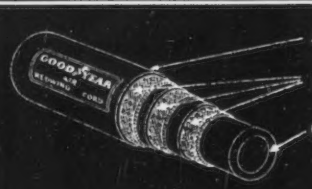
Amsco-nagle pumps are manufactured in sizes 6" to 16", for capacities up to 10,000 G. P. M. and for heads up to 200 feet (250 feet for certain applications). We will be glad to supply you with full information. Write for Bulletin 547-IP for data on all types of Amsco-nagle Industrial Pumps.

AMERICAN Brake Shoe COMPANY

**AMERICAN MANGANESE STEEL DIVISION**
CHICAGO HEIGHTS, ILL.

**Foundries at Chicago Heights, Ill., New Castle, Del., Denver, Colo., Oakland, Calif., Los Angeles, Calif., St. Louis, Mo. Offices in principal cities. In Canada: Joliette Steel Limited, Joliette, Que.**

GOODYEAR INDUSTRIAL
RUBBER PRODUCTS
GT - Specified
REDWING CORD AIR HOSE




A — Cushion cover protects against wear, cuts, abrasion.

B — Multiple-ply, high-tenacity rayon cord for strength and flexibility.

C — Seamless synthetic tube resists lubricants, doesn't flake or swell.

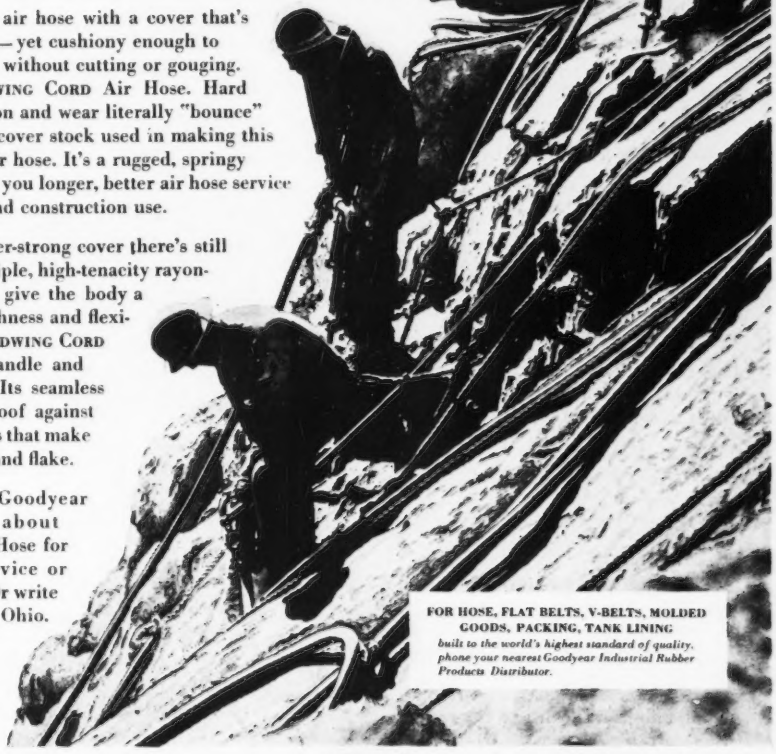
## NEW REDWING CORD AIR HOSE COVER

# bounces away cuts, abrasion, gouges, digs

Now you can buy air hose with a cover that's tire-tread tough — yet cushiony enough to resist heavy impacts without cutting or gouging. It's Goodyear REDWING CORD Air Hose. Hard knocks, digs, abrasion and wear literally "bounce" off the brilliant-red cover stock used in making this radically different air hose. It's a rugged, springy protection that gives you longer, better air hose service in mining, quarry and construction use.

Under this new, super-strong cover there's still more strength. Multiple, high-tenacity rayon-cord reinforcements give the body a combination of toughness and flexibility that makes REDWING CORD Air Hose easy to handle and always dependable. Its seamless synthetic tube is proof against hot or cold lubricants that make ordinary hose swell and flake.

Ask the G. T. M. — Goodyear Technical Man — about REDWING CORD Air Hose for pneumatic tool service or heavy-duty air use. Or write Goodyear, Akron 16, Ohio.

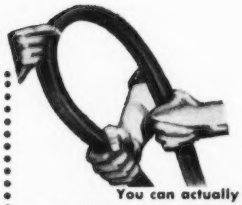


**FOR HOSE, FLAT BELTS, V-BELTS, MOLDED GOODS, PACKING, TANK LINING**
*built to the world's highest standard of quality. phone your nearest Goodyear Industrial Rubber Products Distributor.*

Redwing Cord—T. M. The Goodyear Tire & Rubber Company

# GOODYEAR

**THE GREATEST NAME IN RUBBER**



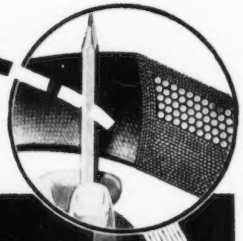
You can actually *feel* the sides of a belt *change shape* as the belt bends.

## In Two Minutes You Can See Exactly How . . .

# The Concave Side

(U.S. Patent No. 1813698)

## SAVES Your Transmission DOLLARS



Take *any* V-belt in your hands and bend it as it bends in going around a pulley. You will see that the top of the belt, being under *tension*, grows *narrower*. The body, under compression, *widens*. The sides *bulge out*.

This shape change—in a *straight-sided* V-belt—is shown in Figures 1 and 1-A, below.

Straight-Sided V-Belt

How Straight-Sided V-Belt Bulges in Sheave-Groove.

Now look at Figures 2 and 2-A. There you see how the *same shape change* affects the V-belt built with the precisely engineered *Concave Side* (U.S. Patent No. 1813698).

Gates Vulco Rope with Concave Side.

No Side Bulge. Precise Fit in Sheave Groove.

The top of the belt narrows, the body widens. But the sides *merely straighten—and* the new shape *exactly fits* the sheave groove!

*Two* savings result. (1) Uniform side-wall wear—*longer life!* (2) Full side-wall grip on the pulley carries heavier loads and *sudden load increases* without slipping; saves belts, saves *power!*

The Mark of SPECIALIZED Research

### The Concave Side is *MORE IMPORTANT NOW Than Ever Before*

Because the sides of a V-Belt are what actually drive the pulley, it is clear that any increased load on the belt means a heavier load that must be transmitted to the pulley directly through the belt's sidewalls.

Now that Gates SPECIALIZED Research has made available to you SUPER Vulco Ropes—carrying fully 40% higher horsepower ratings—the life-prolonging Concave Side is naturally more important in conserving belt life today than ever before.

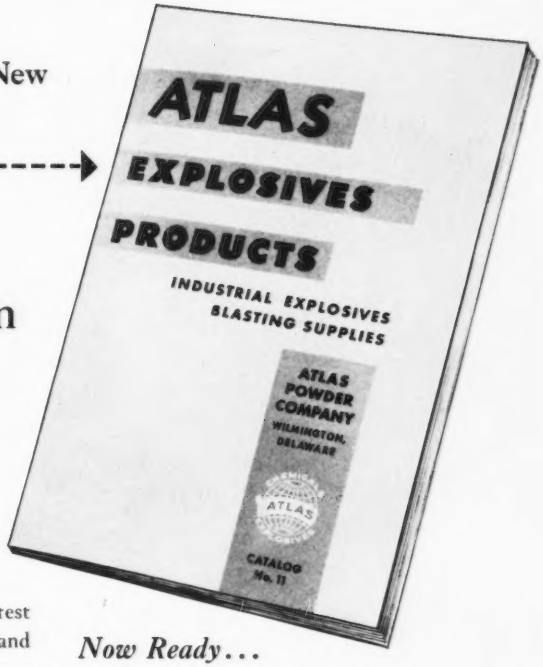
4910

**GATES VULCO ROPE DRIVES**
Engineering Offices and Jobber Stocks IN ALL INDUSTRIAL CENTERS of the U. S. and 71 Foreign Countries

THE GATES RUBBER COMPANY
DENVER, U.S.A.
*The World's Largest Makers of V-Belts*

There's Always Something New
in an Atlas Catalog

# Here's The Latest Word on Industrial Explosives!




THE new Atlas catalog is packed with latest information on explosives, blasting supplies, and accessories.

This book gives you facts to help you choose the *right* explosives products for *your* job. It includes up-to-date information about the complete Atlas line of explosives and blasting supplies for construction, quarrying, coal mining, stripping, demolition . . . including ROCKMASTER "16", the latest development in the original milli-second delay blasting system pioneered by Atlas.

The new Atlas Explosives Catalog is now available to users of explosives. Write to the nearest Atlas office for your copy.

*Now Ready . . .*

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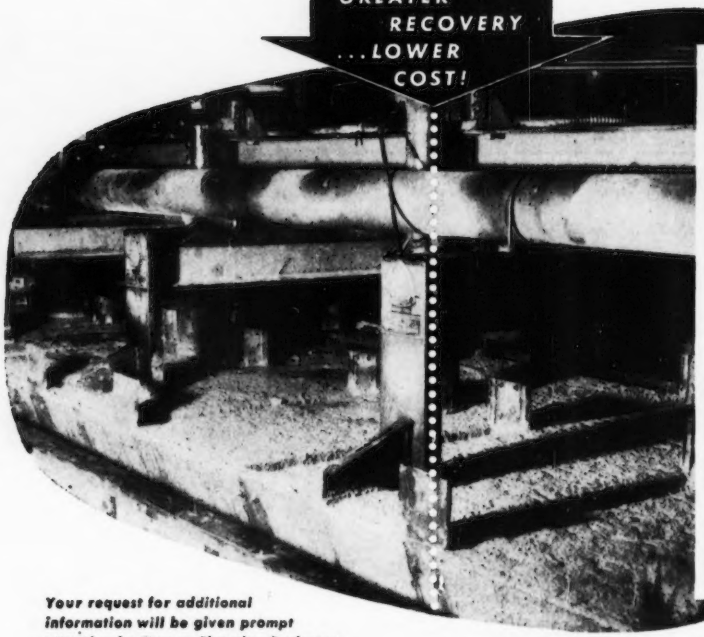
ROCKMASTER: Reg. U. S. Pat. Off.

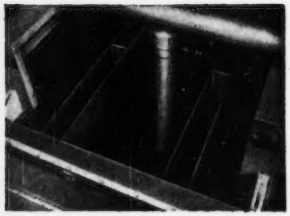
**ATLAS EXPLOSIVES**
*"Everything for Blasting"*

CHEMICALS ATLAS EXPLOSIVES

**ATLAS POWDER COMPANY, Wilmington 99, Del. • *Offices in principal cities* • *Cable Address—Atpowco***

GREATER RECOVERY ...LOWER COST!





Minimum cell obstructions and maximum froth removing transverse launders are features of the New Denver Open Type "Sub-A" Flotation Machine.

*Your request for additional information will be given prompt attention by Denver Flotation Engineers.*

IN SCAVENGING AND ROUGHING WITH

# New DENVER OPEN TYPE FLOTATION MACHINE

***Among the Advantages:***

- Lower tailings . . . higher recovery.
- Increased capacity for rougher and scavenger circuits.
- Lower Power requirements.
- Standard "Denver" wearing parts used throughout.
- Open type machine easily converted to cell-to-cell type if character of ore changes.

Among the reasons for high tailing losses on certain ores is the fact that weakly attached mineral particles never reach the froth overflow level but instead, due partly to interruption in horizontal pulp travel, drop out and are lost in the tailings. Recovery is improved in the New Denver Open Type Flotation Machine due to two distinctive developments.

### *Unobstructed Horizontal Pulp Flow Gives Maximum Recovery*

Elimination of cell partitions and other below-froth-level obstructions in the New Denver Machine permits more mineral particles to more quickly rise to the froth level. Dropping out of weakly attached middling particles is reduced to a minimum, resulting in maximum recovery and lower tailing.

### *Froth Travel Reduced to One Third*

Patented *Transverse Launders* running from front to back of the New Denver Open Type "Sub-A" Flotation Machine reduces froth travel to one third and increases the length of overflow lip to four times that of a single overflow machine.

This more efficient froth removal means fewer mineral particles drop out to become tailing losses. Overall capacity and efficiency of the machine are improved, particularly in treating middlings and in coarse flotation.

DENVER EQUIPMENT 24 HOUR SERVICE COMPANY

FLOTATION ENGINEERS

**New Bulletin on ROUGHER and SCAVENGER FLOTATION**

**will be sent to you on request**

**(May we have your Name, Title, & Address?)**

*"The firm that makes its friends happier, healthier and wealthier"*

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**DENVER EQUIPMENT COMPANY, 1402 17th St., Denver 17, Colorado**

# "NOW WE HAVE NO LOSS OF TIME"

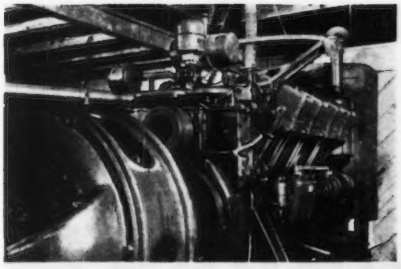
• • • *says Oscar Holbrook, engineer for the Crystal Fluorspar Company, Elizabethtown, Ill. "'Caterpillar' Diesel power," he continues, "has saved us many dollars over the power we formerly used."*

Through a 125-kw. generator, the big D17000 powers the entire plant shown here. It's on the job day in and day out. And that's not unusual for "Cat" Diesels. Underground and in open pits, on placer dredges and in hydraulic operations, and in scores of mining jobs throughout the world, these dependable engines are setting no-down-time records that sometimes seem incredible.

But they're not hard to believe when you consider the unending research, advanced engineering and careful construction that go into "Caterpillar" products. They're all built for long life and hard service—*to make profits for their owners.*

See your "Caterpillar" dealer for further facts and figures about these simple, sturdy, compact power plants. Let him show you what they can do for you.

**CATERPILLAR TRACTOR CO., PEORIA, ILLINOIS**



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**DIESEL** ENGINES • TRACTORS
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**CATERPILLAR TRACTOR CO.**
**Dept. EM-12, Peoria, Ill.**
**Send me your latest book, "Mining for a Profit."**
**Name**_____
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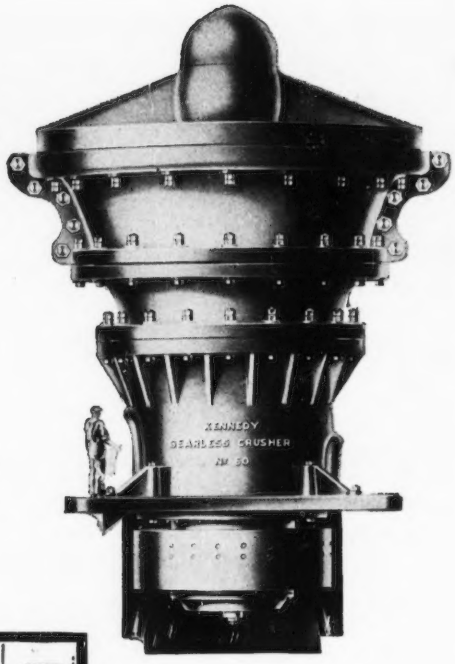
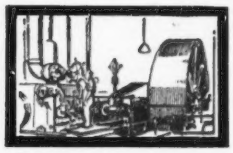
# WANT FREE CRUSHING POWER?

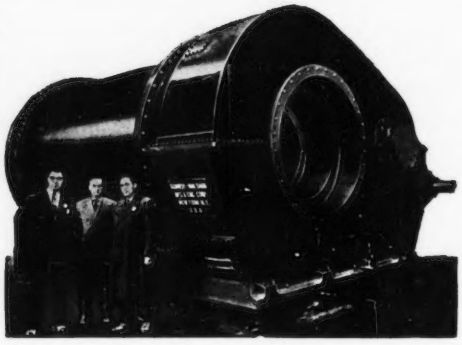



Ever hear of Kinetic energy? It's the extra power that results when a big pulley or flywheel whirls around—like the big pulley on the old Corliss Engine. Well, KINETIC ENERGY is exactly what gives you ADDED FREE POWER in the "KVS" Gearless Crusher, for no added cost. We whirl a BIG pulley in the KVS Gearless! It whirls around at a speed of 3,500 ft. pr minute—and what EXTRA crushing energy or crushing power you get! What's more, the 8-ton pulley (used in a KVS Crusher weighing 400,000 lbs.) whirls so easy you can turn it WITH TWO FINGERS! If there were a bevel gear between the eccentric and the pulley, it would take SIX MEN with crowbars to turn it. In short, more CRUSHING for LESS POWER COST, is the idea that puts KVS way out in front, and keeps it there!



• *Send for the* **NEW "KVS" BULLETIN**

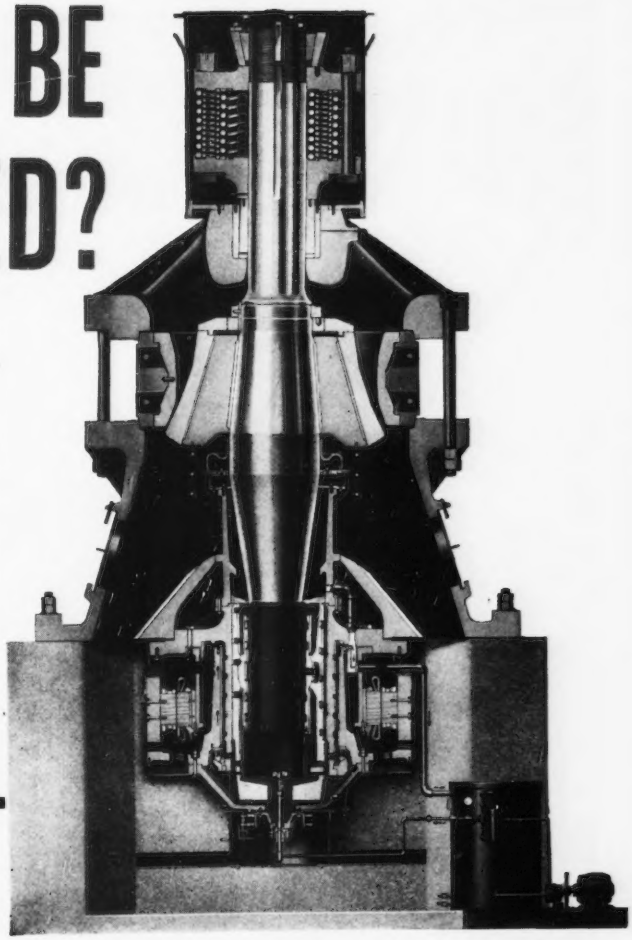
# WANT TO SAVE $6,000?



Say you're buying a 10 ft. tube or ball mill. And suppose you decide on a "KVS" with integral gear drive. The Kennedy INTEGRAL GEAR DRIVE enables motor to be DIRECT CONNECTED to driving shaft. Shaft is carried in roller bearings that CANNOT be misaligned or set wrong. The pinion shaft to which the motor is connected runs at approximately 600 r.p.m. while other pinion shafts run at about 180 r.p.m. ON A 10 ft. MILL THIS ENABLES YOU TO PURCHASE THE SYNCHRONOUS MOTOR AT A SAVING OF ABOUT $6,000. Another point to remember is—"KVS" trunnions on large sized tube and ball mills are CARRIED ON OIL. The bearing never wears out, uses little power. All gears and bearings are automatically sprayed with oil before tube mill is started (Design patented). Believe it or not, in 15 years no "KVS" gears or pinions have worn out on this type mill.

## "THE PRODUCTS WITH THE TROUBLES LEFT OUT...

# WANT TO BE CONVINCED?



**SPEAKING OF CRUSHING . . . .**

**LOCATION:** NATIONALLY KNOWN MINING CO.
NEW YORK STATE

**CRUSHERS:** FOUR NO. 37½ KENNEDY TYPE "S"
ROLLER BEARING GYRATORY CRUSHERS

**FEED OPENING:** 6¼"; **DIAMETER OF HEAD:** 3 FEET

**DISCHARGE SETTING:** 7/32" CLOSED SIDE AT HEAD

**CAPACITY EACH CRUSHER:**
56 TONS PER HOUR

**HORSEPOWER EACH CRUSHER:** 48 HP.

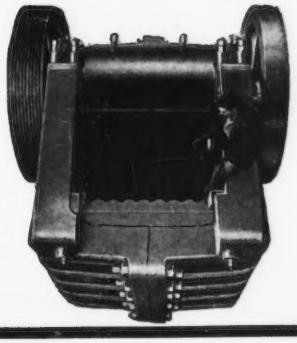
**CLOSED CIRCUIT OPERATION**
GRADATION AS FOLLOWS:

**THE FIGURES!**

| | | | |
|---|---|---|---|
| 99.8% | Minus | 3 | MESH |
| 93.3 | " | 4 | " |
| 80.6 | " | 6 | " |
| 66.6 | " | 8 | " |
| 56.1 | " | 10 | " |
| 48.1 | " | 14 | " |
| 40.6 | " | 20 | " |

***Can You Equal These Figures?***

# WANT TO KNOW HOW?



How can the "KVS" Swing Jaw Crusher do MORE crushing and yet use LESS POWER than ordinary swing jaw crushers? Well, we'll tell you. The angle of both swing jaw and stationary jaw is THE SAME. Stationary jaw carries fully 50 percent of load . . . result, you need LESS POWER to keep the swing jaw swinging and crushing. Note another thing—the swing jaw is all ONE PIECE, except renewable crushing plate. Also swing and stationary jaws are interchangeable, both the same length, and reversible end-for-end, giving twice as much crushing life before renewal is needed.

**Kennedy-Van Saun**
MANUFACTURING AND ENGINEERING CORPORATION

**2 PARK AVE., NEW YORK 16, N. Y.**

**FACTORIES:**
**DANVILLE, PA., U.S.A.**
CANADA, ENGLAND, FRANCE, AUSTRALIA

THE TIGER BRAND SPECIALIST SAYS—
"It's not use but abuse
USS
AMERICAN
TIGER BRAND
WIRE ROPE
UNITED STATES STEEL

# that determines wire rope life"

## *check your application*

"Everything was wrong on this job. When I arrived the superintendent and the operator were having a terrific argument. The 'Super' claimed that the operator was wearing out wire rope twice as fast as anybody else on the job. The operator blamed the machine. I could see that nobody knew the real source of trouble.

"I offered to give them a complete check-up and they both jumped at the chance. It turned out that they were using cast iron sheaves which were too soft. To make it worse, the wire rope was not preformed and tended to twist and squirm as it passed over the sheaves.

"The rope bit into the sheaves and the sheaves got rough and chewed up the rope.

"That's the story. I recommended harder manganese steel sheaves and Excellay Preformed Wire Rope. With the right rope for the job, they ought to get twice the service."

### How proper wire rope application saves you money

There is always *one* best type of wire rope for every application and the TIGER BRAND Wire Rope Specialist can help you select the *right* ropes for your particular needs. His job is to make sure that the rope is not overloaded. He checks the sheaves for proper size, wear and alignment. He instructs your operators on proper rope care and does a dozen other things to assure long service life at low unit cost for wire rope.

To help you maintain these operating standards, we have prepared a booklet entitled, "Valuable Facts about the use and care of Wire Rope." Every key man on your operating staff should be supplied with this much needed information.

***SEND FOR FREE BOOKLET***

American Steel & Wire Company
Rockefeller Building, Dept. C-12
Cleveland 13, Ohio

Gentlemen:

Please send me a copy of your booklet, "Valuable Facts about the use and care of Wire Rope."

Name.....

Company.....

Position.....

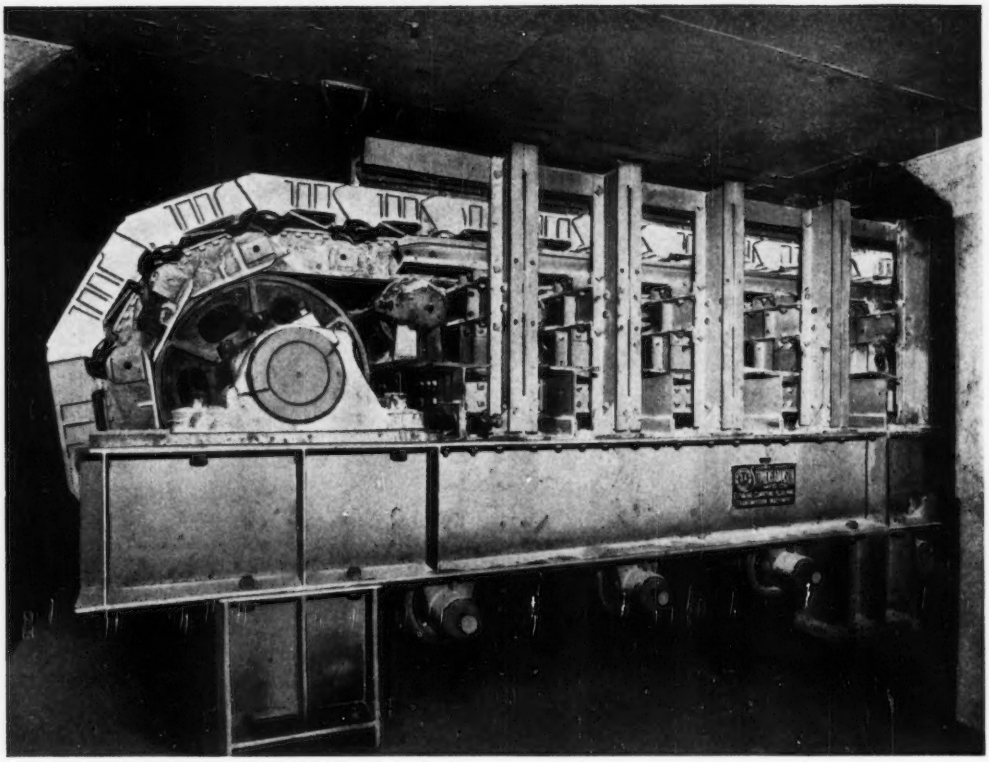
Address.....

AMERICAN STEEL & WIRE COMPANY, GENERAL OFFICES: CLEVELAND, OHIO
COLUMBIA STEEL COMPANY, SAN FRANCISCO
TENNESSEE COAL, IRON & RAILROAD COMPANY, BIRMINGHAM, SOUTHERN DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

**AMERICAN TIGER BRAND WIRE ROPE**

*Excellay Preformed*

UNITED STATES STEEL



# Clears Throat of Giant "Glory" Hole

Without repairs . . . without replacements, this giant AMSCO pan feeder has taken more than 14 million tons of copper ore from the "glory" hole of this mine. The huge pans keep the throat clear without blocking or arching. Such continuous, dependable service is a tribute indeed to the excellence of AMSCO design and construction.

For almost half a century S-A engineers have been tackling the "tough ones" in bulk materials handling . . . applying the right engineering and design to systems that handle the most tons—at lowest cost per ton. Working as they do with a complete line that includes *every* type of bulk materials handling equipment, their recommendations meet the most demanding requirements of any specific job.

Put these years of experience to work for you. The recommendations of the S-A staff of engineers are yours for the asking . . . no obligation, of course. Write today.

CASTLE DOME COPPER CO.
MIAMI, ARIZONA

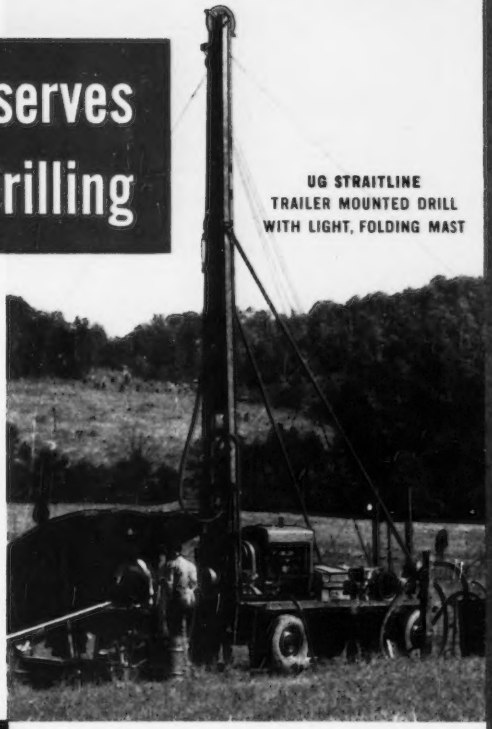
*Widest unit ever built, the pans of this AMSCO manganese steel pan feeder are 10' 6" wide and the feeder centers (distance from head to tail shaft) are 25 feet. Pans are 1¼" thick, 18" pitch and are overlapping and non-spilling. Pans are mounted on three strands of manganese steel, non-sagging chain. Pans, chain (including bushings and pins), sprockets and supporting rollers are all manganese steel. Wide pans prevent blocking or arching of ore in throat of "glory" hole. 20 HP drive has a variable speed unit that permits handling from 250 to 1000 TPH.*

**STEPHEN S-A DAMSON MFG. CO.**

4 Ridgeway Avenue, Aurora, Illinois · Los Angeles, Calif. · Belleville, Ontario

**DESIGNERS AND MANUFACTURERS OF ALL TYPES OF BULK MATERIALS HANDLING EQUIPMENT**

# Increase Mineral Reserves By Diamond Core Drilling

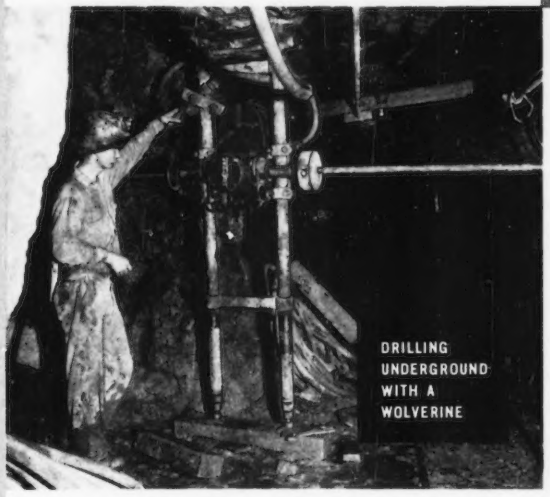


UG STRAITLINE
TRAILER MOUNTED DRILL
WITH LIGHT, FOLDING MAST

● Rich orebodies become worked out. Even reserves, once adequate, are dangerously low in many cases, yet the long term demand for minerals increases.

How is this challenge to be met? First of all, new deposits must and can be found by systematic exploratory search. Second, every effort should be made to expand present reserves.

**The LONGYEAR organization will help you to accomplish the above objectives. It will supply you with drills suited to your job, or it will do your drilling under contract, if you prefer.**



DRILLING
UNDERGROUND
WITH A
WOLVERINE

**CORE DRILLING ON CONTRACT.** In contracting your drilling to LONGYEAR, you gain the following advantages:

**WITHOUT INVESTMENT** *on your part, modern LONGYEAR core drills and equipment are available for your drilling projects.*

**EXPERIENCED CREWS,** *using the latest drilling techniques, carry out your exploratory program in accord with your wishes.*

**YOU ARE PROVIDED** *with accurate samples, most essential factors in your mineral search.*

---

**DIAMOND CORE DRILLS.** LONGYEAR manufactures a complete line of diamond core drills and equipment.

**LIGHTWEIGHT,** *easily set up machines are built for underground use.*

**STURDY,** *mobile equipment is available for rapid surface exploration.*

**POWERFUL DRILLS** *are made to meet the requirements of deep hole drilling.*

● CONSULT US ON THE PROBLEM OF INCREASING YOUR MINERAL RESERVES

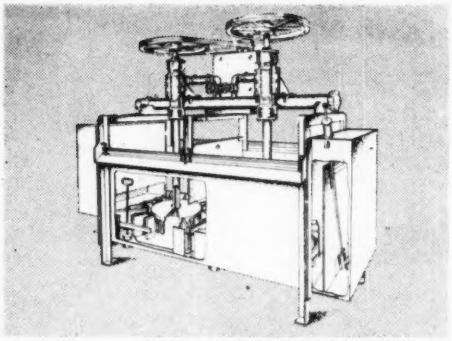
## E. J. LONGYEAR COMPANY

MINNEAPOLIS, MINNESOTA, U.S.A. NEW YORK OFFICE, 50 BROADWAY

CANADIAN LONGYEAR, LIMITED, NORTH BAY, ONTARIO, CANADA

DIAMOND CORE DRILLS • CONTRACT CORE DRILLING
SHAFT SINKING • GEOLOGICAL INVESTIGATIONS

REPRESENTATIVES IN PRINCIPAL MINING CENTERS IN THE UNITED STATES AND OTHER COUNTRIES



# Cut your 'down time' from hours to minutes with these Exclusive Features

# AGITAIR provides:

The matchless efficiency of AGITAIR results both from its unique principle of recovery and the application of the principle in a simple rugged machine that permits of easy repairs and reduces lost mill motion to a negligible minimum.

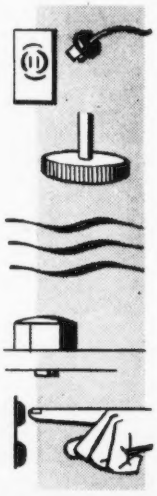
**Quick assembly removal.** Like pulling a plug — the bearing assembly is easily removed from the tank. Just remove end bolts and lift out — requires little head room — gives unobstructed access to bearings, shaft and impeller.

**Easy-to-repair impeller.** The welded steel construction of the impeller provides a ductile core which can be bent back into shape should it sustain damage through collision with some foreign object in the tank.

**Uninterrupted flow.** Bearing assemblies or impellers can be changed without interrupting the flow of pulp. No clean-up is required.

**Quick drain.** Removable plug is easily accessible if complete clean-up is necessary.

**Start-up under full load.** Only 80% of AGITAIR's power is required for normal operation. There's plenty of reserve power for starting after temporary shutdowns.



*"Leaders in Experience and Service"*

**THE GALIGHER COMPANY**

METALLURGICAL DIVISION — ENGINEERING SERVICE

AGENTS IN ALL PRINCIPAL FOREIGN MINING DISTRICTS

[redacted] *added safety* **means** *added production*

# ALONG THE IRON RANGE!

Here are just a few of the Added Values that change down-time and delays into actual digging time . . . added production.

**"Run away" Dangers eliminated** — independent propel keeps crawler geared to propel power at all times.

**Automatic Safety Brakes** — prevent damage and delays — all brakes are spring set automatically when power is cut off.

**Excessive Boom Jacking is prevented** — P&H's boom limit switch positively prevents raising boom above normal position. You save on boom cable replacement costs.

**Accessible Controls** — all controls including propel brakes and steering are within easy reach of the operator.

These and other important Added Values explain why users along the Iron Range are reordering P&H Electric Shovels.

P&H

ELECTRIC SHOVELS

CORPORATION

EXCAVATORS • OVERHEAD CRANES • ARC WELDERS and ELECTRODES • SOIL STABILIZER • CRAWLER and TRUCK CRANES • DIESEL ENGINES • CANE LOADERS • PREASSEMBLED HOMES

# Specify Thermoid Steam Hose

## Powerflex Wire Braid Steam Hose

Unequalled for strength and flexibility, it offers more capacity, greater safety, longer wear. The tough, thick, heat-resisting inner tube is of specially compounded black rubber . . . high-tensile steel wire braids safeguard against bursting . . . asbestos braid dissipates heat and firmly bonds the cover to the hose body. Special cover is heat and abrasion resistant. Furnished in sizes from ½" to 2½", in lengths up to 50 feet. An all-purpose steam hose for all pressures up to 200 psi.

## Hi-Temp Steam Hose

Mandrel-built—special heat-resisting rubber tube . . . braided asbestos-yarn reinforcement . . . heat and wear resistant cover. Furnished in sizes from ½" to 2" inside diameter in 25 or 50 foot lengths. A lighter weight all-purpose steam hose for superheated steam up to 200 psi.

## #300 Steam Hose

Heat-resisting rubber tube. Cotton fabric reinforcement. Heat and wear resistant cover. Furnished in sizes ½" to 2½", in 25 and 50 foot lengths. For general service where steam pressure does not exceed 150 psi.

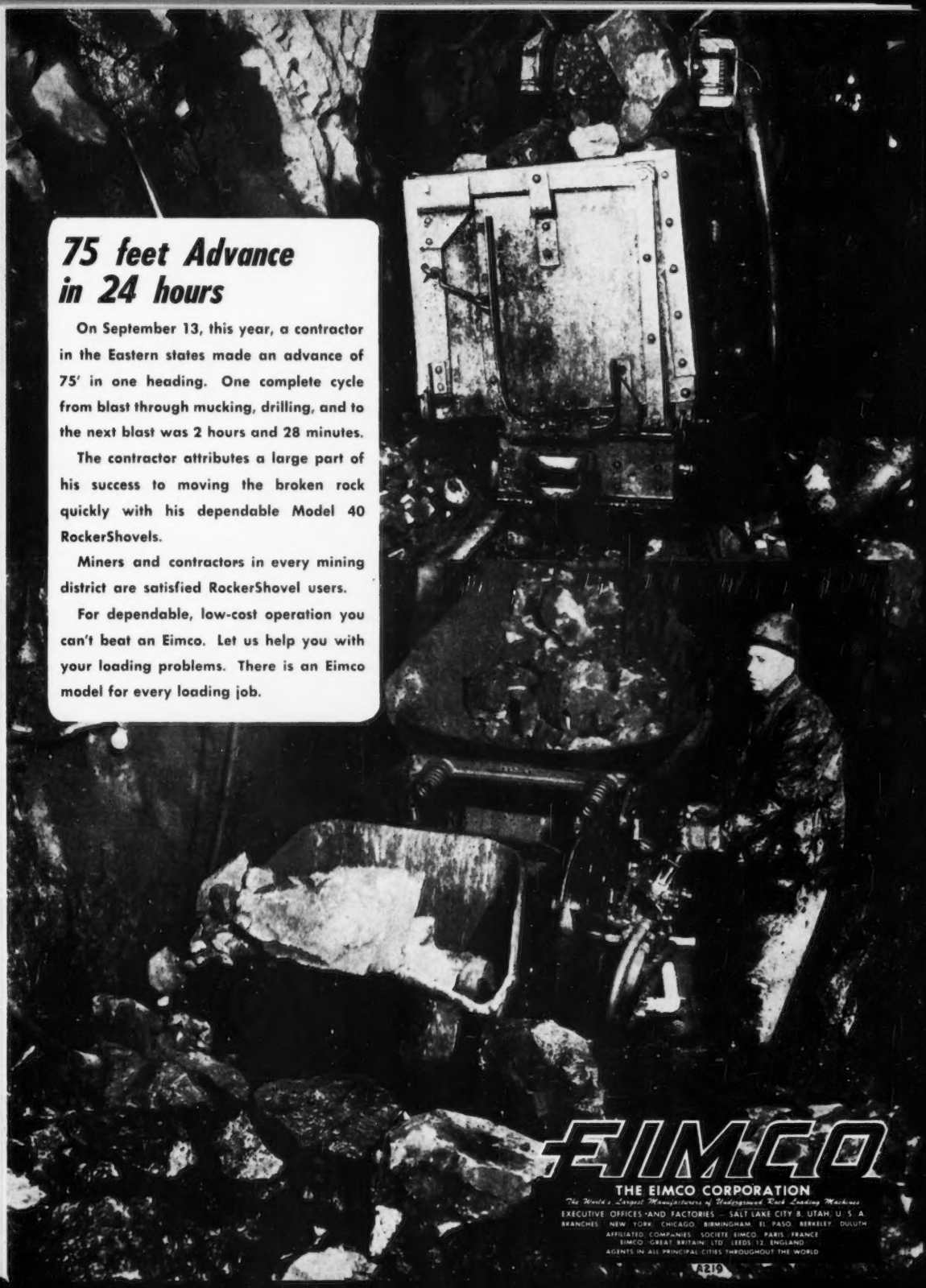
**These latest developments** in steam hose are typical of the results obtained through Thermoid's continuing research and study of product applications. Thermoid's planned program of product research and development assures you of maximum service and lowest operating costs whenever you specify Thermoid Industrial Rubber Products.

It will pay you to ***Specify*** Thermoid!

*Thermoid Quality Products: Transmission Belting • F.H.P. and Multiple V-Belts • Conveyor Belting • Elevator Belting • Wrapped and Molded Hose • Molded Products • Industrial Brake Linings and Friction Materials.*

**Thermoid Company**

Main Offices and Factory • Trenton, N. J., U. S. A.
Western Offices and Factory • Nephi, Utah, U.S.A.
*Industrial Rubber Products • Friction Materials • Oil Field Products*



# 75 feet Advance in 24 hours

On September 13, this year, a contractor in the Eastern states made an advance of 75' in one heading. One complete cycle from blast through mucking, drilling, and to the next blast was 2 hours and 28 minutes.

The contractor attributes a large part of his success to moving the broken rock quickly with his dependable Model 40 RockerShovels.

Miners and contractors in every mining district are satisfied RockerShovel users.

For dependable, low-cost operation you can't beat an Eimco. Let us help you with your loading problems. There is an Eimco model for every loading job.

EIMCO

THE EIMCO CORPORATION

*The World's Largest Manufacturers of Underground Rock Loading Machines*

EXECUTIVE OFFICES AND FACTORIES — SALT LAKE CITY 8, UTAH, U. S. A.

BRANCHES: NEW YORK, CHICAGO, BIRMINGHAM, EL PASO, BERKELEY, DULUTH

AFFILIATED COMPANIES: SOCIETE EIMCO, PARIS, FRANCE
EIMCO (GREAT BRITAIN) LTD., LEEDS 12, ENGLAND

AGENTS IN ALL PRINCIPAL CITIES THROUGHOUT THE WORLD

A219

# JOY
# COMPRESSORS

*HANDLE YOUR MINING NEEDS*

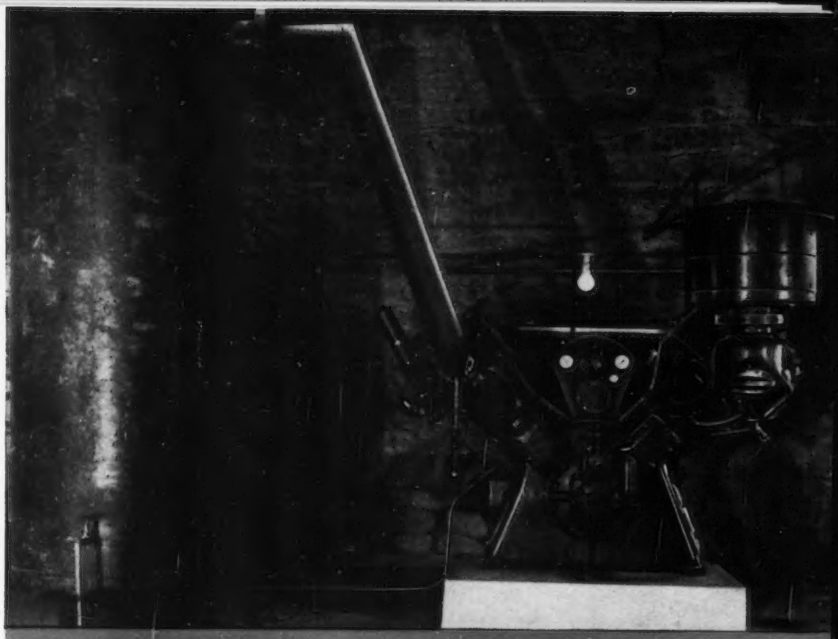
*AT LOWEST COST*

*OVER THE LONG PULL!*

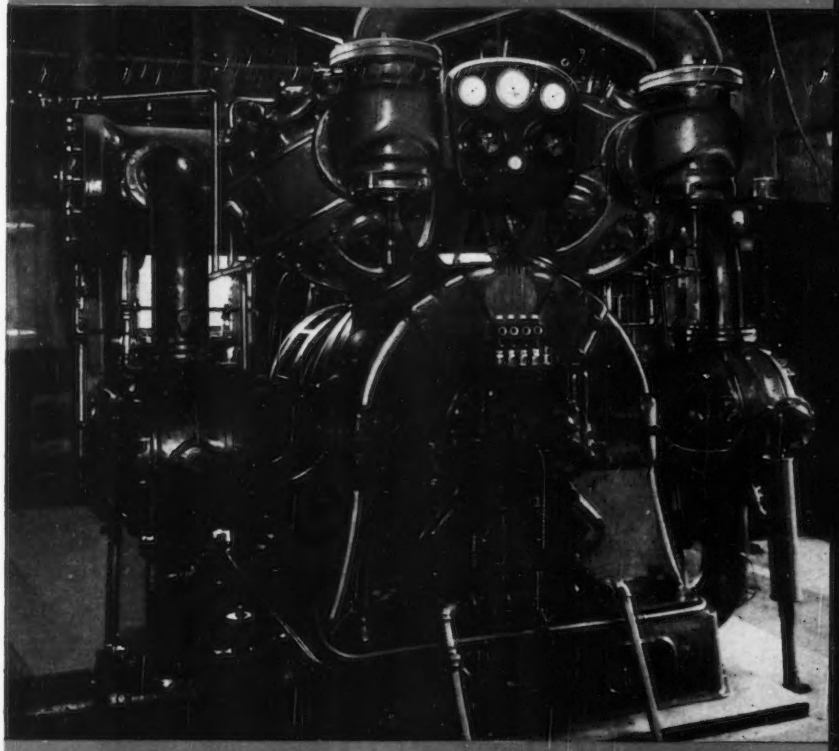
## *LET US PROVE THESE SUPERIORITIES OF JOY STATIONARY COMPRESSORS!*

- ★ **Require less room—Cost less to install**
- ★ **Exclusive DUAL-CUSHION VALVES—more efficient and durable in service**
- ★ **Exclusive LOAD CONTROL—lower operating cost**
- ★ **Simpler Design—Longer Life—Less Maintenance**

*JOY WN-112, two cylinder, two stage, double acting, is a heavy duty, continuous type compressor, built in capacities from 368 to 1828 CFM, and up to 3656 CFM as twin units.*



*JOY WN-114 in various sizes delivers from 1092 to 3656 CFM, and up to 7312 CFM in twin units. It's a heavy duty, continuous type four cylinder unit; two stage, double acting.*



**Write for Bulletins, or**

*Consult a Joy Engineer*

W&D M 2828

# JOY MANUFACTURING COMPANY

**GENERAL OFFICES: HENRY W. OLIVER BUILDING · PITTSBURGH 22, PA.**

IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO

# new!

## a 55-lb. class sinker with a 4-in-1 backhead

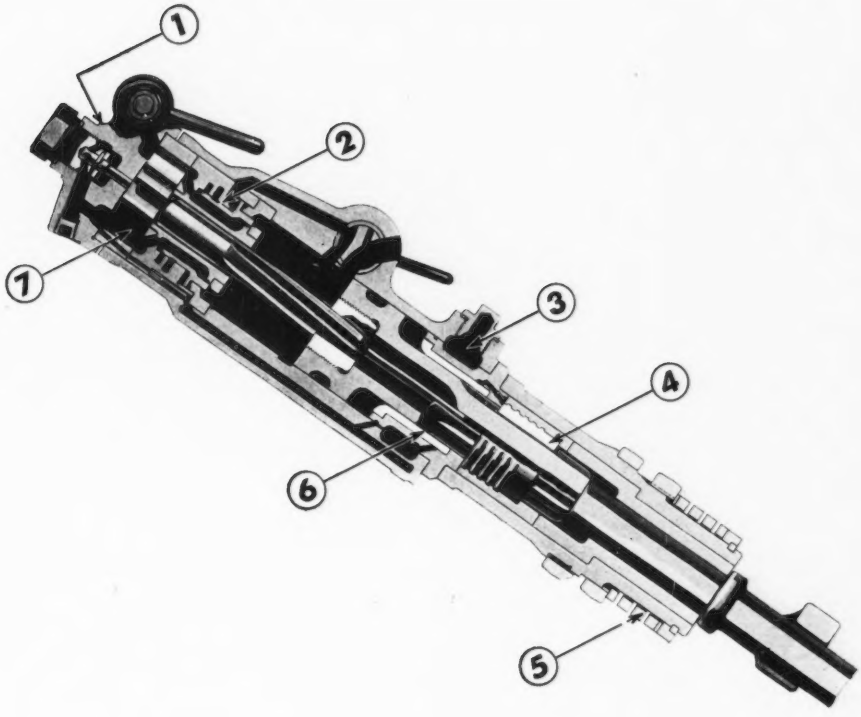
New in design . . . easy to hold . . . tops in drilling speed, rotation, hole cleaning and all-around performance . . . is the new CP-59 Sinker Drill.

Now, for the first time, you can get a sinker with a 4-in-1 backhead that meets *all* operating conditions: **plain dry . . . blower dry . . . plain wet . . . air-water** operation. One backhead meets all four requirements; change-overs from one type to another are quick and inexpensive.

Entirely new valve design gives maximum drilling speed and rotation power, with minimum air consumption. Large, flexible retainer spring makes for easy operation. A new type of lubricating system assures positive lubrication of all working parts.

Rotation nut and cylinder bushing liner are bronze, to eliminate scoring and reduce maintenance.

*For complete information, ask for SP-3009.*




**Top performance, minimum upkeep are assured by these features of new CP-59 Sinker:**

**1** Four-in-one backhead: plain dry, blower dry, plain wet, air-water operation.

**2** New type valve gives exceptional drilling speed with powerful rotation.

**3** One oil chamber efficiently lubricates entire drill.

**4** Replaceable bronze chuck rotation nut protects piston splines from scoring.

**5** Large, flexible retainer spring assures easy operation.

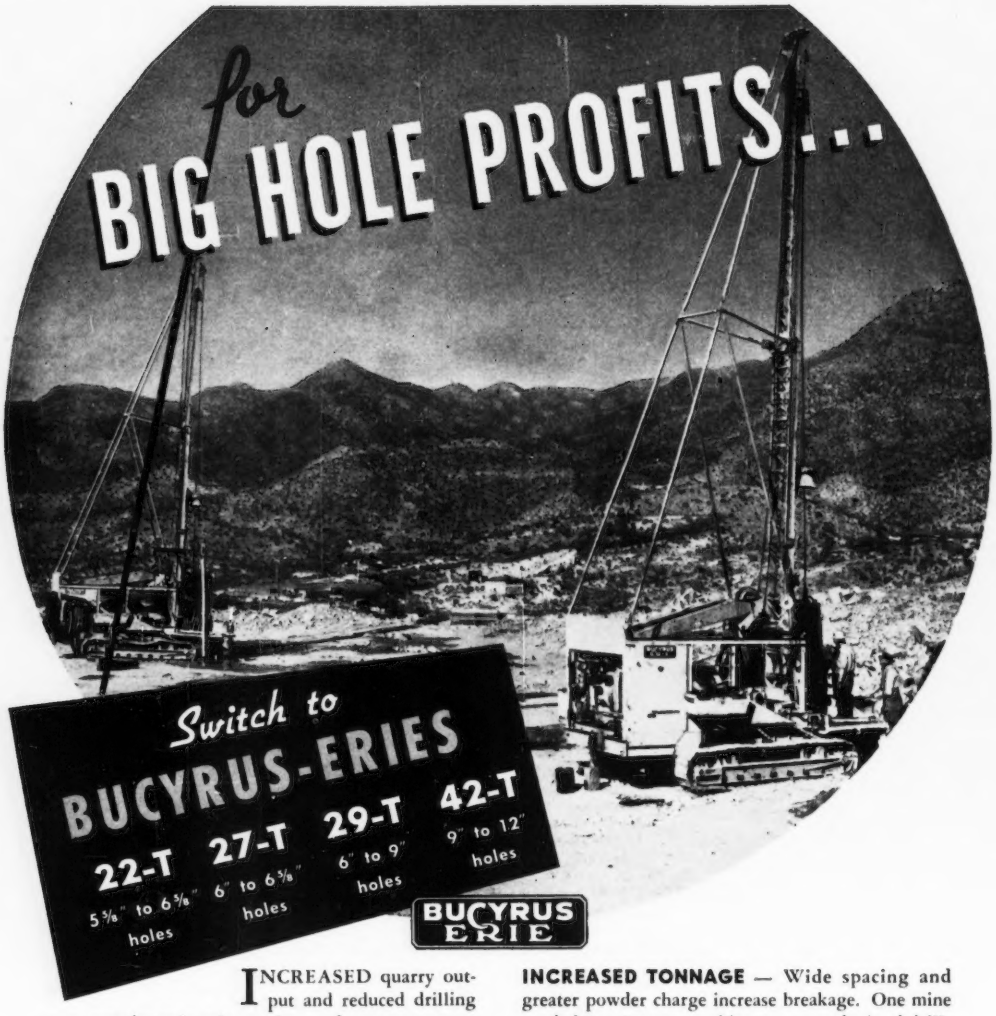
**6** Replaceable bronze cylinder bushing liner makes it easy to maintain full cushion and piston alignment.

**7** Four reversible pawls double service life.

CHICAGO PNEUMATIC TOOL COMPANY

General Offices: 8 East 44th Street, New York 17, N. Y.

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES
ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES




INCREASED quarry output and reduced drilling costs are the rule when mine and quarry owners switch to the large-diameter holes drilled by modern Bucyrus-Erie blast hole drills. Here's why:

**GREATER EXPLOSIVE CAPACITY** — A 9" hole, for example, holds 125% more explosive than a 6" hole. Holes may thus be more widely spaced, necessitating fewer holes. Greater mass of explosive produces better fragmentation, less need for secondary blasting.

**COMBATS SPRUNG HOLES** — Large diameter hole takes a greater powder charge at bottom of hole, assures pulling the toe of the bank.

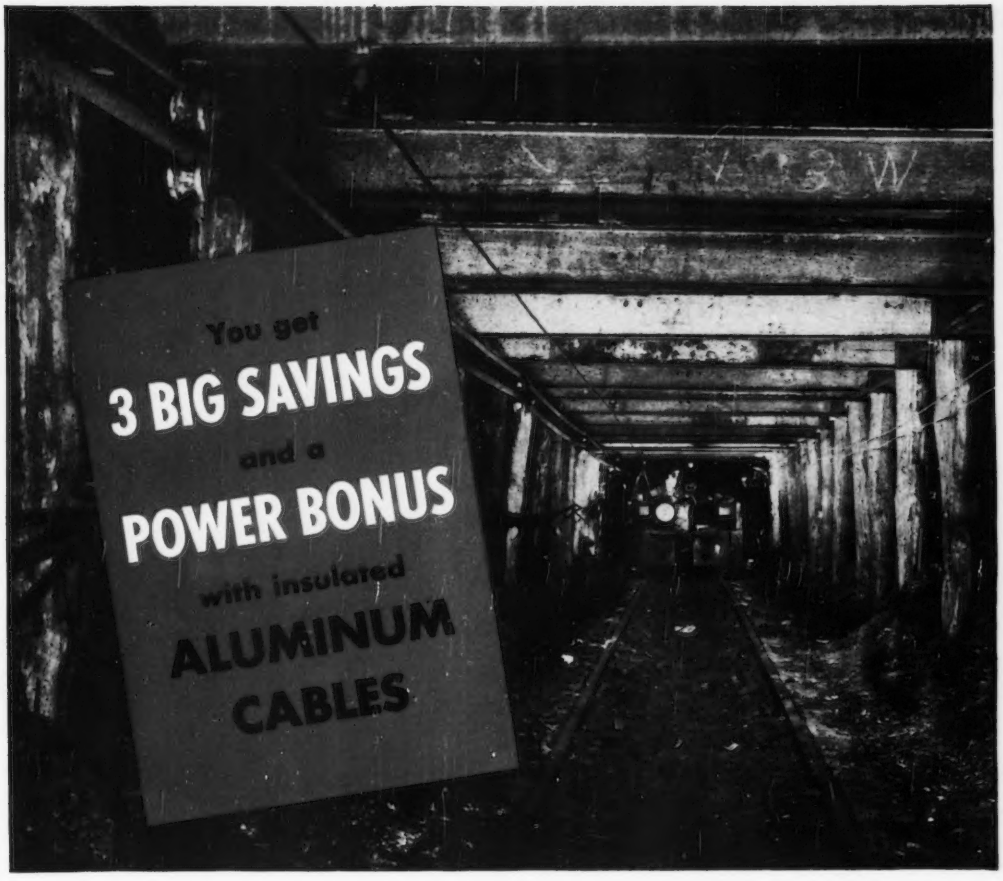
**INCREASED TONNAGE** — Wide spacing and greater powder charge increase breakage. One mine needed 2 or 3 crews working wagon and tripod drills to prepare 1000 tons of ore per day. Now a Bucyrus-Erie-equipped crew prepares 600 tons per hour.

**EXPLOSIVE AND DRILLING COST NOT CHANGED** — Ratio of explosive to rock prepared remains constant no matter what size hole is used. In most cases, the cost per foot of drilling large-diameter holes is equal to or less than the cost per foot of drilling small holes.

For the facts on how Bucyrus-Eries can raise your quarry or mine output, see your local distributor or write to

30E45

**Bucyrus-Erie Company** • South Milwaukee, Wisconsin



**The BIG DIFFERENCE is in your COSTS!**

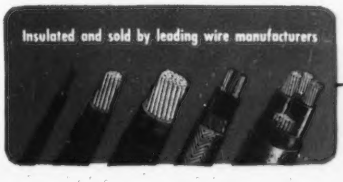
Power and feeder cables with Alcoa E.C.* Aluminum conductor cost less to ship, less to install, and less to buy. The larger the cable, the bigger the saving. Its lighter weight, for example, can mean only two men for installation where you used to use four. Lower transportation costs, too.

You can get a power bonus, as well. The bigger sizes usually specified mean less voltage drop—more power to working faces. Acid mine waters don't faze aluminum, either. On your next cable installation, ask your chief electrician to *figure it in aluminum.*

Alcoa makes light, strong, conductive E.C. Aluminum. Leading wire and cable manufacturers draw, strand, and insulate it, and sell it under their own trade-marks.

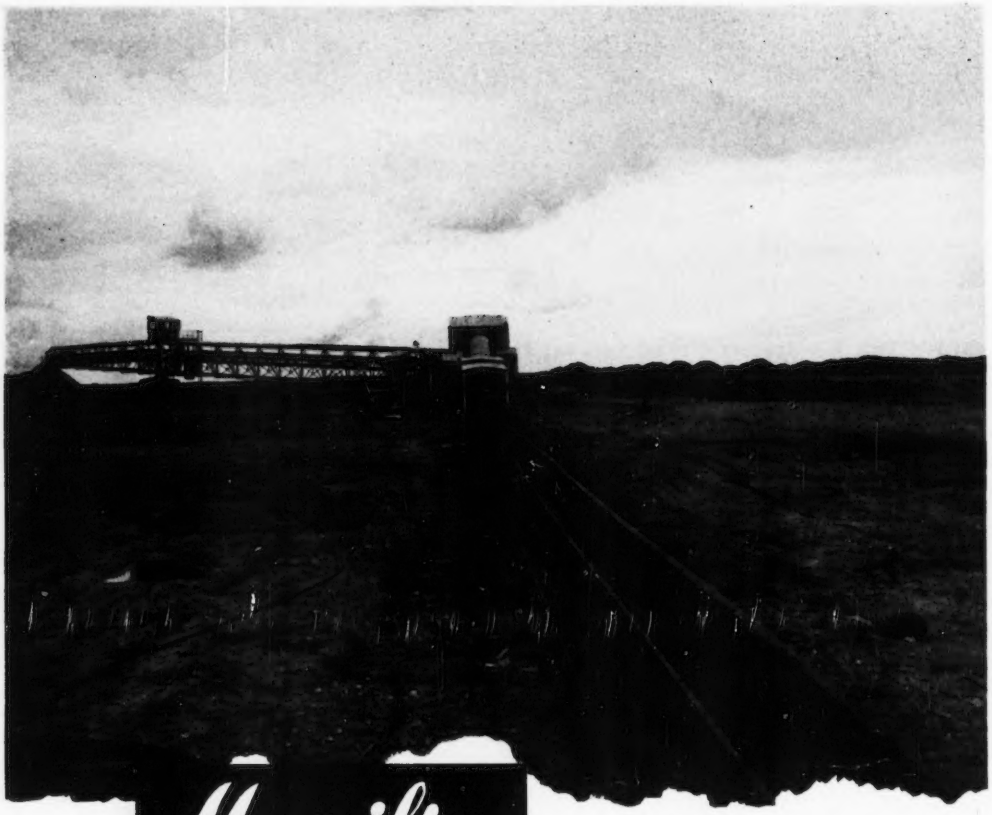
Ask your wire supplier about it, or write ALUMINUM COMPANY OF AMERICA, 1476M Gulf Building, Pittsburgh 19, Pennsylvania.

*E.C.: *Electrical Conductor* Aluminum




**ALCOA EC ALUMINUM**

**FOR ELECTRIC WIRE AND CABLE**



**Hamilton**
RUBBER PRODUCTS

## *Meet the Rugged Specifications of the Iron Range:*

Here—a big, rugged job being done by HAMILTON Belting! At this Minnesota mine 85,000,000 cubic yards of overburden are being removed.

Throughout all industry HAMILTON Rubber Products are known for their wear-ability, performance, and economical cost. You also can save by using HAMILTON Products.

***Send for our Catalogue #EM.***

1870

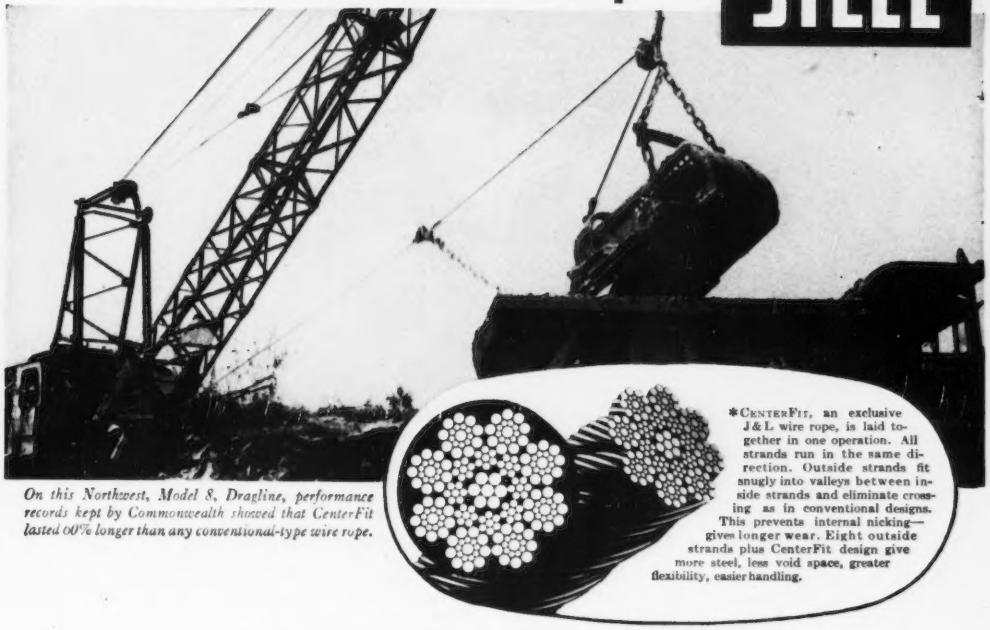
**HAMILTON RUBBER MANUFACTURING CORP.**
TRENTON · NEW JERSEY

NEW YORK CHICAGO PITTSBURGH INDIANAPOLIS HOUSTON LOS ANGELES SAN FRANCISCO

## COMMONWEALTH SAND & GRAVEL CORP.

# gets 30% to 60% longer service with J&L CenterFit* Wire Ropes

**J&L STEEL**



*On this Northwest, Model 8, Dragline, performance records kept by Commonwealth showed that CenterFit lasted 60% longer than any conventional-type wire rope.*

*CenterFit, an exclusive J&L wire rope, is laid together in one operation. All strands run in the same direction. Outside strands fit snugly into valleys between inside strands and eliminate crossing as in conventional designs. This prevents internal nicking—gives longer wear. Eight outside strands plus CenterFit design give more steel, less void space, greater flexibility, easier handling.*

## . . . *in addition,* CenterFit* Wire Ropes *cost less than ropes replaced*

Commonwealth Sand and Gravel Corporation, of Richmond, Va., produces 75,000 to 80,000 tons of sand and gravel a month. In such an operation wire rope draglines are of vital importance—important enough to maintain detailed service records that show the life obtained from each wire rope.

Let's look at Commonwealth's records with J&L CenterFit:

**On a Northwest, Model 8, dragline with a 2 cu. yd. bucket, conventional wire rope draglines had an average life of from 90 hours to 100 hours. The first J&L CenterFit preformed Permaset wire rope dragline used on this machine lasted 160 hours. The second, still in service, has equalled this record.**

**On a Marion 362 dragline with a 1½ cu. yd. bucket, J&L CenterFit wire rope draglines lasted, on the average, more than 30% longer than higher priced conventional wire rope.**

It's records like these that prove again and again the extra value and savings operators get from CenterFit preformed Permaset—an exclusive J&L wire rope construction. J&L CenterFit has greater strength and flexibility than most wire ropes. Under constant usage J&L CenterFit usually outlasts other types of wire rope and is, therefore, more economical to operate.

The new J&L booklet "CenterFit" tells you where to use this exclusive wire rope. It is written for the man on the job. Let us send you a copy.

Jones & Laughlin Steel Corporation
412 Jones & Laughlin Building
Pittsburgh 19, Pa.

Please send me a copy of your new wire rope booklet describing "CenterFit" wire rope.

NAME_____

COMPANY_____

ADDRESS_____

## JONES & LAUGHLIN STEEL CORPORATION

*From its own raw materials, J&L manufactures a full line of carbon steel products, as well as certain products in* OTISCOLOY *and* JALLOY *(hi-tensile steels).*

**PRINCIPAL PRODUCTS:** HOT ROLLED AND COLD FINISHED BARS AND SHAPES • STRUCTURAL SHAPES • HOT AND COLD ROLLED STRIP AND SHEETS • TUBULAR, WIRE AND TIN MILL PRODUCTS • "PRECISIONBILT" WIRE ROPE • COAL CHEMICALS

THE NEW

# Edison

# *First and Foremost*

**with dependable, effective light for the miner!**

## Model R-4 Electric Cap Lamp

The latest and finest development of the world-famous EDISON Electric Cap Lamp is *the new R-4 that gives you more!*

*More light... even greater dependability... increased effectiveness...enhanced durability*—all are yours in Model R-4, new from headpiece to battery case, for finer safety and better mining efficiency.

Let us prove to you how R-4's many extra advantages can benefit your own operation. We'll gladly arrange an on-the-job demonstration—write!

**MINE SAFETY APPLIANCES COMPANY**

BRADDOCK, THOMAS AND MEADE STREETS . . . . . PITTSBURGH 8, PA.

*At Your Service:* 48 BRANCH OFFICES in the UNITED STATES

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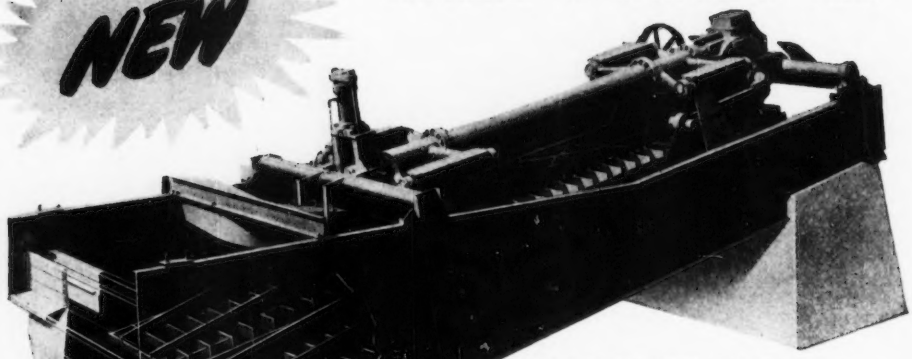
NEW

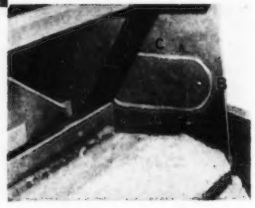
## a major advance in the mechanical refinement of classification units



THE DORR HX CLASSIFIER—DUPLEX MODEL

# ...the Dorr TYPE H Classifier

◀ Chalk marking the rake path of a duplex Dorr HX Classifier in shop demonstration.



Type H Classifier rake path ▶ chalked on side of tank. Note flat raking and return strokes (A and C) and elliptical raising and lowering strokes (B and D). Regular pattern of rake path shows how rakes are synchronized both horizontally and vertically and balanced at all times.

*Incorporating* an entirely new and radically different headmotion design and rake path, the new Dorr Type H Classifier line represents a major step forward in the mechanical refinement of classification units. It offers many definite advantages over its predecessor, the Type F . . . yet retains all the features which have made the Dorr Classifier an accepted standard throughout the world.

Simplicity is the keynote of Type H design. It has few moving parts and the simplest Classifier lubrication system yet devised. It employs a fully harmonic raking motion and a long, full-load raking stroke. It is equipped with a hydraulic lift mechanism that provides more than 12 inches of rake lift in the pool. It is designed for *work* . . . for high efficiencies and low operating cost.

*Bulletin #2281 gives complete information on this radically different unit. Write for your copy now . . . or better still, have a Dorr engineer show you what the superiority of Type H design means in terms of your own operation. No obligation, of course.*

DORRCO

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PETREE & DORR DIVISION, NEW YORK 22, N. Y.
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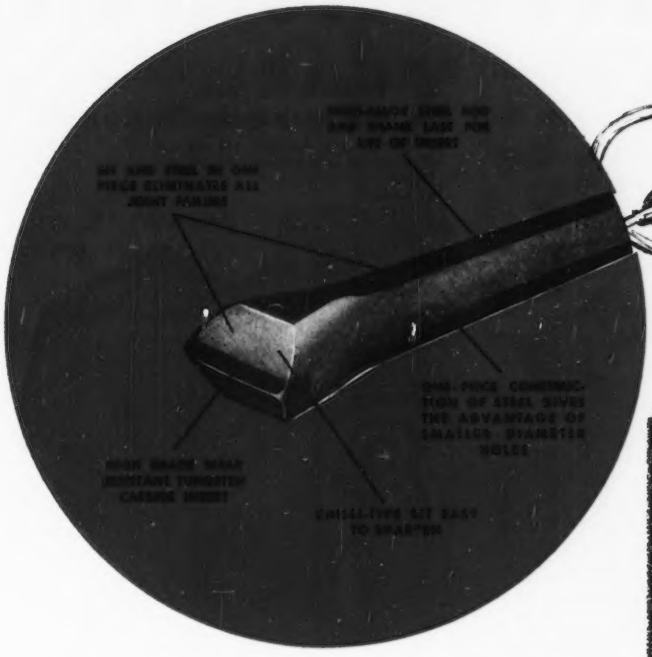
Dorr Technical Services and Equipment Are Also Available Through Associated Companies and Representatives in the Principal Cities of the World. Names and Addresses on Request.

DORR
RESEARCH [illegible] EQUIPMENT

# WHY SANDVIK COROMANT STEELS TAKE THE "TROUBLE" OUT OF DRILLING

## *With Tungsten Carbide Bits*



Sandvik COROMANT steels eliminate all of the common objections to drilling with tungsten carbide bits, such as: Frequent breakage of threaded joints . . . failure of carbon-steel rods and shanks with consequent loss of time in detaching bits . . . and relatively large diameter rods and bits necessitated by threaded connection.

The Sandvik COROMANT bit consists of a sintered tungsten carbide insert, brazed into a slot in the bit, which is forged from the drill rod end. Because there is no joint between rod and bit, the rod and bit can be small in diameter. The rod is made of high-alloyed steel that utilizes the full drilling life of the carbide insert.

Small diameter bits, combined with the little loss of gauge from wear of the reaming edges, makes it possible to drill small holes of uniform diameter, with resulting improvement in efficiency and savings in cost of explosives.

Another advantage of Sandvik COROMANT steels is that they permit the use of lighter, less-expensive drills. For best results, we recommend the ATLAS DIESEL rock drills described on this page.

### ATLAS DIESEL ROCK DRILLS

Specially designed for operation with COROMANT, tungsten-carbide-tipped steels, these drills combine a light blow with fast rotation. They increase drilling footage per man-hour, while cutting labor costs, compressed air consumption and rock drill upkeep. They are easy to set up, and so light in weight they are handled by one man. Combined with the ATLAS-DIESEL pneumatic pusher, they provide light, portable, easy-to-handle drilling assemblies which can be used in small spaces.

***Send for complete information and prices of Sandvik COROMANT steels and ATLAS DIESEL drills.***

**SANDVIK STEEL, INC., 111 Eighth Ave., New York 11, N.Y. WAtkins 9-7180**

180 N. Michigan Ave., Chicago 1, Ill. FRAnklin 1745
1736 Columbus Rd., Cleveland 14, Ohio CHerry 2303

SS-50

# TIMKEN® ANNOUNCES REVOLUTIONARY

**1. EASIER TO GET ON AND OFF!**

A few blows of the drill and it's on! A few blows of a hammer and it's off! Smooth socket contours assure easy detachability.

**2. STAYS ON MORE DEPENDABLY!**

New One-use "Spiralock" Timken rock bit has square socket that spirals slightly as it recedes, forming a "Spiralock" union that prevents bit coming off the steel in the hole.

**3. NON-CHOKING BACK FACE!**

Back face is scalloped and rounded-off to prevent chips packing behind bit.

**4. MADE OF TIMKEN ELECTRIC FURNACE STEEL**

Fast Cutting.
Long lasting.
Uniform quality.

**5. NON-RIFLING**

The "X" cutting edge of the "Spiralock" bit prevents rifling in any ground.

# NEW ONE-USE BIT WITH "SPIRALOCK" UNION

## Latest addition to the TIMKEN® rock bit line offers unequalled advantages for many operating conditions

**6. CROWNED CHISEL PILOT**
Easier starting and centering.

**7. SIMPLIFIES PREPARATION OF DRILL STEELS**
Due to "Spiralock" union, steels last much longer — are easier to prepare and recondition. Square steel ends simplify fitting. They may be machined or forged.

**8. ANY STEELS CAN BE USED!**
Existing drill steels of any size and section can be easily and quickly adapted to the One-use "Spiralock" Timken rock bit.

For drilling jobs where bit reconditioning is impractical or undesirable, The Timken Roller Bearing Company announces a One-use "Spiralock" rock bit which takes its place alongside the famous Multi-use Threaded Timken rock bit that has been standard in the mining and construction industries for 17 years, and the Carbide-Insert Threaded Timken rock bit introduced more recently.

The new One-use "Spiralock" Timken rock bit offers more advantages than any other rock bit of its type. It has a revolutionary "Spiralock" union, whose superiority has been proved under actual on-the-job conditions. Designed for fast drilling at low cost, the One-use Timken rock bit with "Spiralock" union is made in a variety of types and sizes.

For help in selecting the right bit for your job — whether it's the One-use "Spiralock" Timken rock bit, the Multi-use Threaded Timken rock bit or the Carbide-Insert Threaded Timken rock bit — call upon our rock bit engineering service.

**THE TIMKEN ROLLER BEARING COMPANY, CANTON 6, OHIO**
**Cable Address "TIMROSCO"**

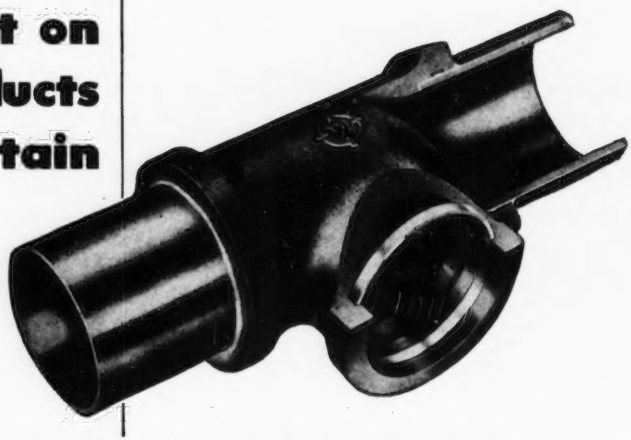
# TIMKEN
TRADE-MARK REG. U. S. PAT. OFF.
## ROCK BITS

***Your best bet for the best bit for every job.***

| Carbide Insert Threaded Timken Rock Bit | Multi-use Threaded Timken Rock Bit | One-use "Spiralock" Timken Rock Bit |
|---|---|---|

# DON'T BE SATISFIED WITH HALF-WAY MEASURES...

## insist on Walseal® products and be certain



**— the FACTORY INSERTED Ring insures FULL PENETRATION of the Silver Alloy . . . a perfect joint**

Today, contractors . . . builders . . . architects are using brazed connections, in ever increasing numbers on their brass and copper pipe runs. However, they must be certain that the correct brazing alloy is used; that the joint has penetration of alloy up the shoulder of the fitting.

That's why more and more are turning to Silbraz® joints made with Walseal valves, fittings and flanges which assure the proper amount of alloy with no waste. They know that the finished joint not only will withstand hydrostatic pressure, but it will also withstand terrific impact and vibration – in fact, no correctly made Silbraz joint has ever been known to creep or pull apart under any pressure, shock, vibration or temperature which the pipe itself can withstand.

Furthermore, it is a relatively simple operation to make a Silbraz joint – no heavy scaffolding need be erected . . . just cut the pipe, flux, assemble, then braze, following the technique recommended by the Walworth Company. A silver brazing alloy – FACTORY INSERTED – in each port flows out when heated with the oxyacetylene torch, making a joint that is stronger than the pipe itself . . . a one-hand operation, with the mechanic out of the path of the deflected heat – at all times.

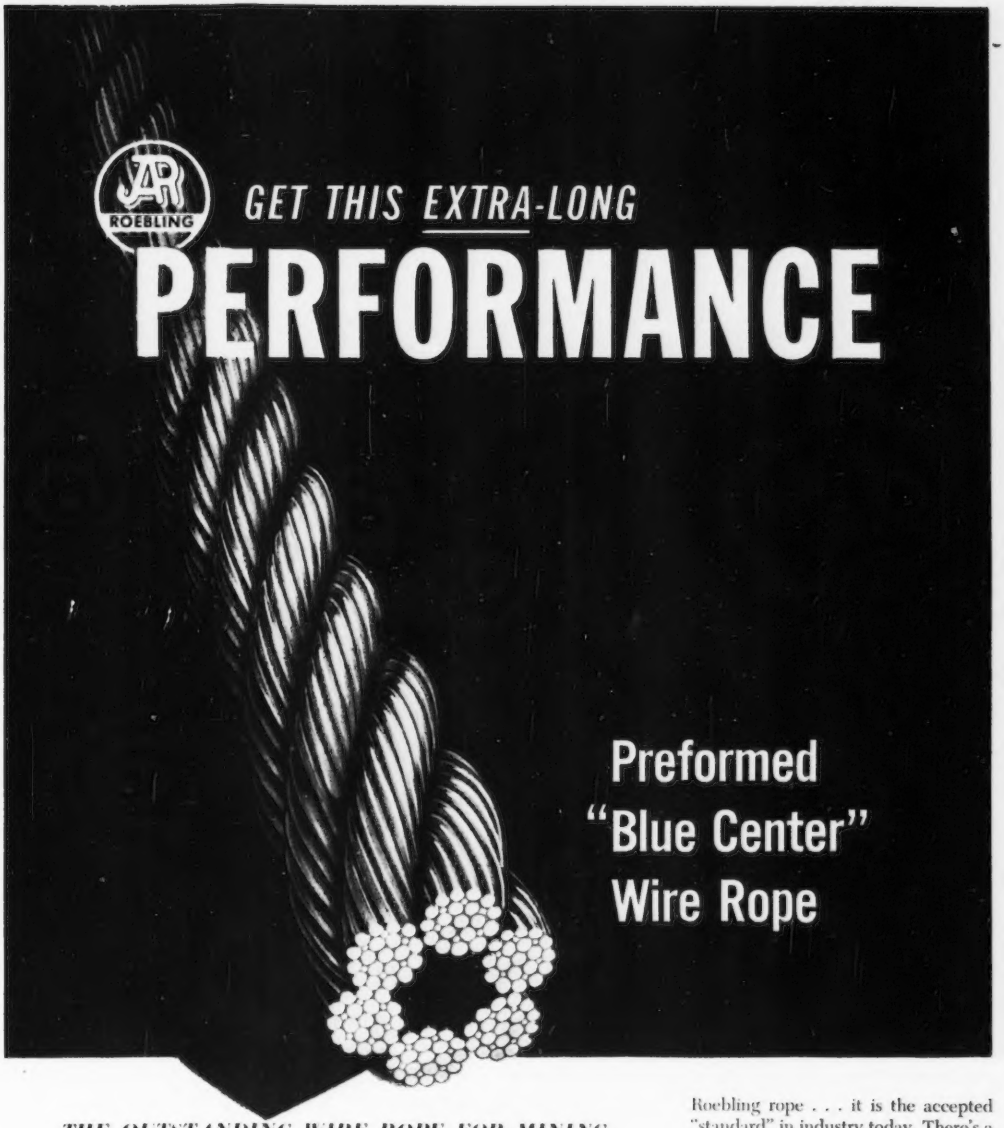
***For full information about Silbraz joints made with Walseal products, write for Circular A-1.***

# WALWORTH

**valves and fittings**

**60 EAST 42nd STREET, NEW YORK 17, N. Y.**

DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD




*THE OUTSTANDING WIRE ROPE FOR MINING*

THE ONE THAT LASTS LONGEST ...that's the most economical wire rope you can buy! And "Blue Center" Steel—made only by Roebling—gives wire rope that *extra-long* service life. With Roebling Preformed "Blue Center" you save dollars that really count.

To this, add the other advantages of Roebling Preformed wire rope. It's not inclined to twist and kink . . . is easy to handle and install. It can be cut without seizing. Broken wires stay flat and don't injure sheaves or drums.

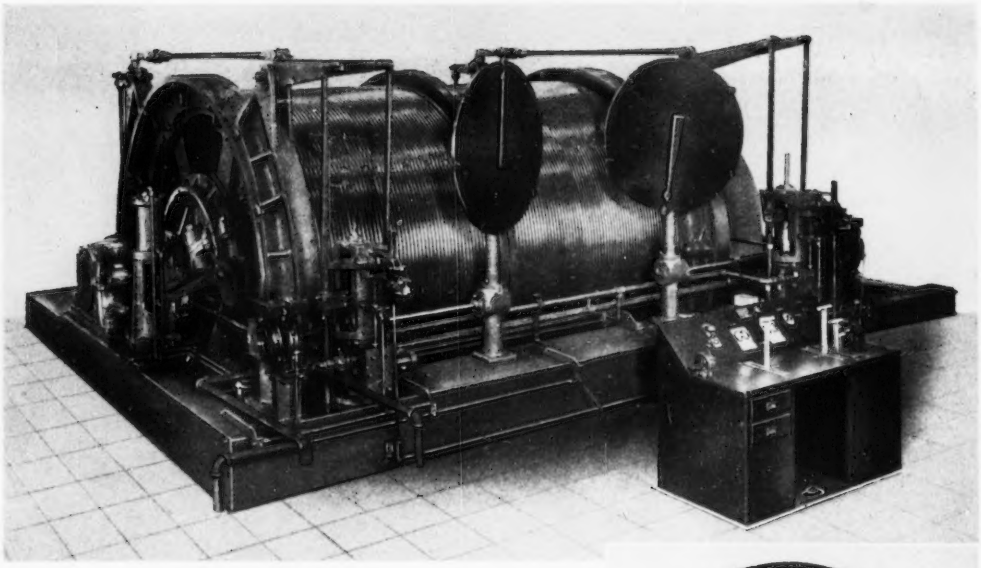
You can have full confidence in Roebling rope . . . it is the accepted "standard" in industry today. There's a type and size of Roebling Preformed "Blue Center" Steel Wire Rope for every purpose. Have your Roebling Field Man recommend the best one for your requirements . . and show you economical methods of installation and maintenance. John A. Roebling's Sons Company, Trenton 2, N. J.

*WRITE OR CALL THE ROEBLING FIELD MAN AT YOUR NEAREST ROEBLING OFFICE AND WAREHOUSE*

*Atlanta*, 934 Avon Ave. ★ *Boston*, 51 Sleeper St. ★ *Chicago*, 5525 W. Roosevelt Rd. ★ *Cleveland*, 701 St. Clair Ave., N. E. ★ *Denver*, 1635 17th St. ★ *Houston*, 6216 Navigation Blvd. ★ *Los Angeles*, 216 S. Alameda St. ★ *New York*, 19 Rector St. ★ *Philadelphia*, 12 S. 12th St. ★ *Pittsburgh*, 355 W. North Ave. ★ *Portland, Ore.*, 1032 N. W. 14th Ave. ★ *San Francisco*, 1740 17th St. ★ *Seattle*, 900 First Ave.

ROEBLING

☆ A CENTURY OF CONFIDENCE ☆



# Roller Bearings Minimize Friction In This Modern VULCAN Hoist

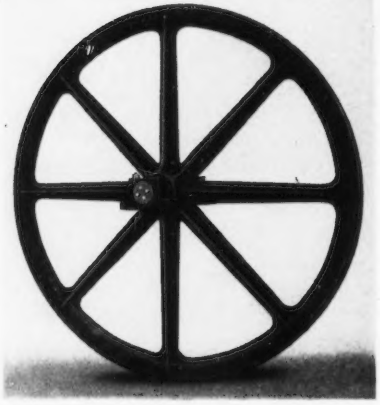
**Designed and built to meet the specific requirements of a well-known metal mining company, the hoist shown above, assembled in a Vulcan shop, "has everything" to promote fast, safe, convenient operation.**

**When installed, it will be driven by dual 250 hp. motors through flexible couplings and single-reduction herringbone gears running in oil. The main shaft and both of the two pinion shafts are mounted in spherical-roller-bearing pillow blocks to minimize friction and assure permanently accurate alignment. All operating levers and instruments are grouped at a control desk on the floor level, providing SIMPLIFIED EFFORTLESS CONTROL.**

Other modern equipment includes parallel-motion post-type brakes on each drum and a toothed-type positive clutch on one drum. Brake and clutch engines are operated by oil-hydraulic pressure. Brake and clutch on the loose drum are mechanically and electrically interlocked.

The all-steel "built-up" drums are 10'-0" diam. by 6'-2" face with machine-cut grooves for 1609 feet of 1⅜" rope in one layer. Each drum is equipped with a gear-driven safety controller which provides complete protection for hoisting from several different levels.

**Your operating conditions may require an entirely different type of hoist but Vulcan's experienced engineers will welcome an opportunity to submit an equally suitable design. No charge or obligation—just give us the necessary data.**



## VULCAN ALLCASTEEL SHEAVES
### WITH ROLLER BEARINGS

were furnished for use with this hoist and for other hoists operated by the same company. The sheave here illustrated is 10 ft. pitch diam., grooved for 1¾" rope and equipped with tapered roller bearings in the hub. The "dead" shaft is held in clamp-type steel pedestals. Light, strong, true-running and so highly resistant to rope wear that NO LINERS ARE NEEDED, Vulcan Allcasteel Sheaves have proved their money-saving superiority for every type of heavy-duty service. Bulletin A-396 (20 pages, fully illustrated) gives complete information.

# Vulcan Iron Works

Established 1849

## WILKES-BARRE, PA., U.S.A.

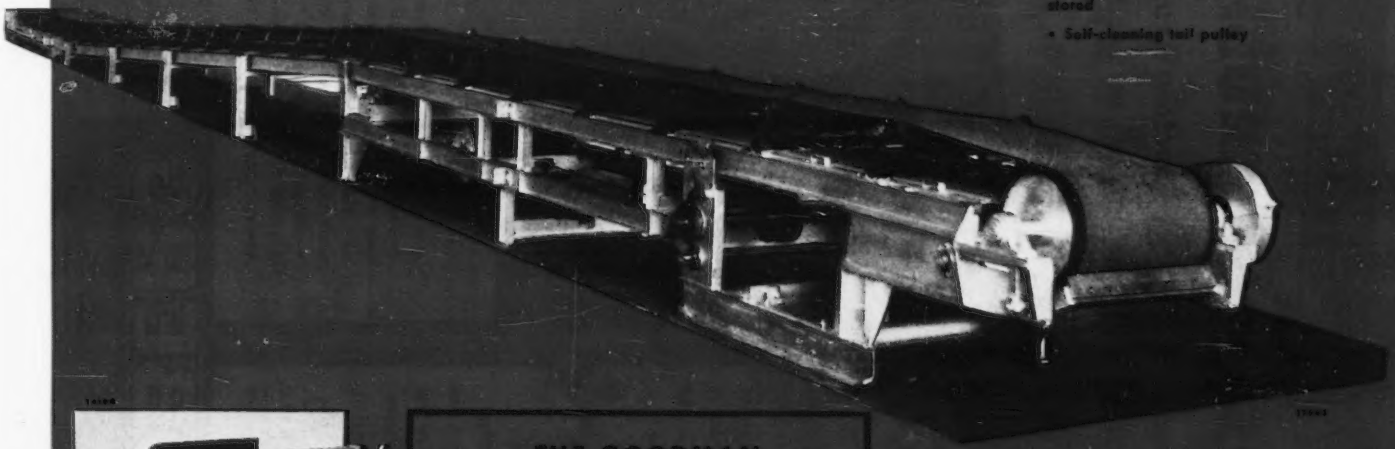
Cable Address "Vulworks Wilkes-Barre"

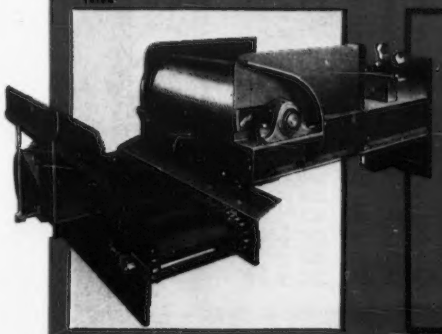
Manufacturers, also, of Underground Conveyors and all types of Electric Locomotives for underground service.

# GOODMAN BELT CONVEYORS

## TYPE 99-6

- Strength and rigidity for heavy metal mine service
- No outside anchors required for head or tail ends
- Lateral alignment without loss of vertical flexibility
- "Knockdown" construction; parts easily handled, compactly stored
- Self-cleaning tail pulley





### THE GOODMAN PATENTED YO-YO

A discharge boom conveyor for continuous loading of a car haulage trip without slowing the belt. It is reversible for discharge to right or left—insures capacity loading of each car without spillage. Unit receives power by roller chain from sprocket on discharge pulley shaft of belt conveyor.

GOODMAN MANUFACTURING COMPANY

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In Great Britain: The Distington Engineering Company, Ltd.

# FIRST CHOICE OF SUCCESSFUL OPERATORS

# SYMONS CONE CRUSHERS

***used the world over in reduction crushing of metallic and industrial minerals***

SUCCESSFUL operators recognize the dependability of Symons Cone Crushers. The great number of repeat orders Nordberg receives from major producers of ores and industrial minerals all over the world is evidence of the superior performance of Symons Cone Crushers — the crushers that produce greater quantities of finer products at lower cost.

Built in three types — Standard, Short Head and Intermediate, in a wide range of sizes—there is a Symons Cone Crusher for practically every fine reduction crushing operation. Write for detailed information.

**NORDBERG MFG. CO.**
MILWAUKEE 7, WISCONSIN
New York • San Francisco • Washington • Spokane
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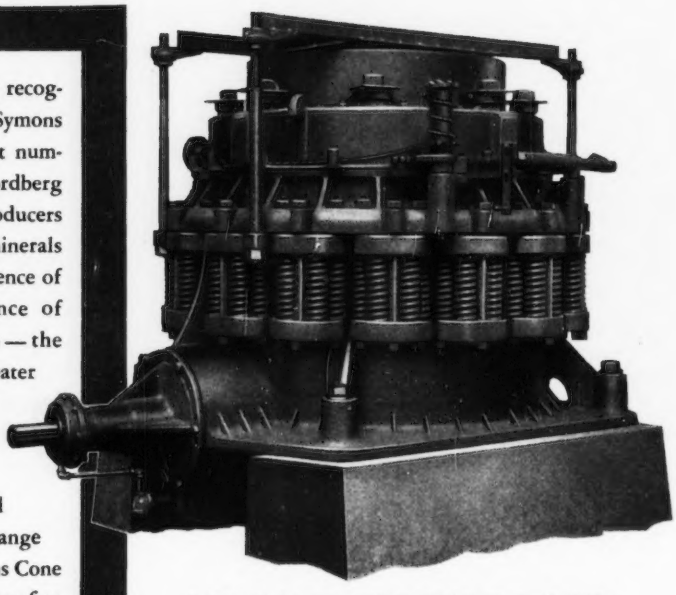

**A few of the ores and industrial minerals being crushed by Symons Cone Crushers include: iron • gold • silver • copper • nickel • zinc • lead • tin • molybdenum • antimony • radium • uranium • titanium • bismuth • chromium • tungsten • manganese • vanadium • barite • cobalt • graphite • potash • feldspar • fluorspar • asbestos • asphalt • nitrate, etc.**

**NORDBERG** *Machinery for processing ores and industrial minerals*

**Whatever the kind or quantity of steel you want—**

MORE than ever before, we are equipped to give your orders for steel unexcelled attention. Our warehouses, coast-to-coast, have the facilities, the equipment and the personnel to satisfy your requirements—whether you need a pound or a ton of steel. Furthermore, our metallurgists are always ready to assist you with any problem of steel selection or application.

So, make it a rule—whenever you need steel—Stainless, High Strength, Alloy . . . Hot Rolled or Cold Finished Bars, Structural Shapes, Plates, Sheets, Aluminum, Metal-Working Tools, Supplies, and Machinery—to "Call Us." Just phone, wire or write the warehouse or sales office nearest you.

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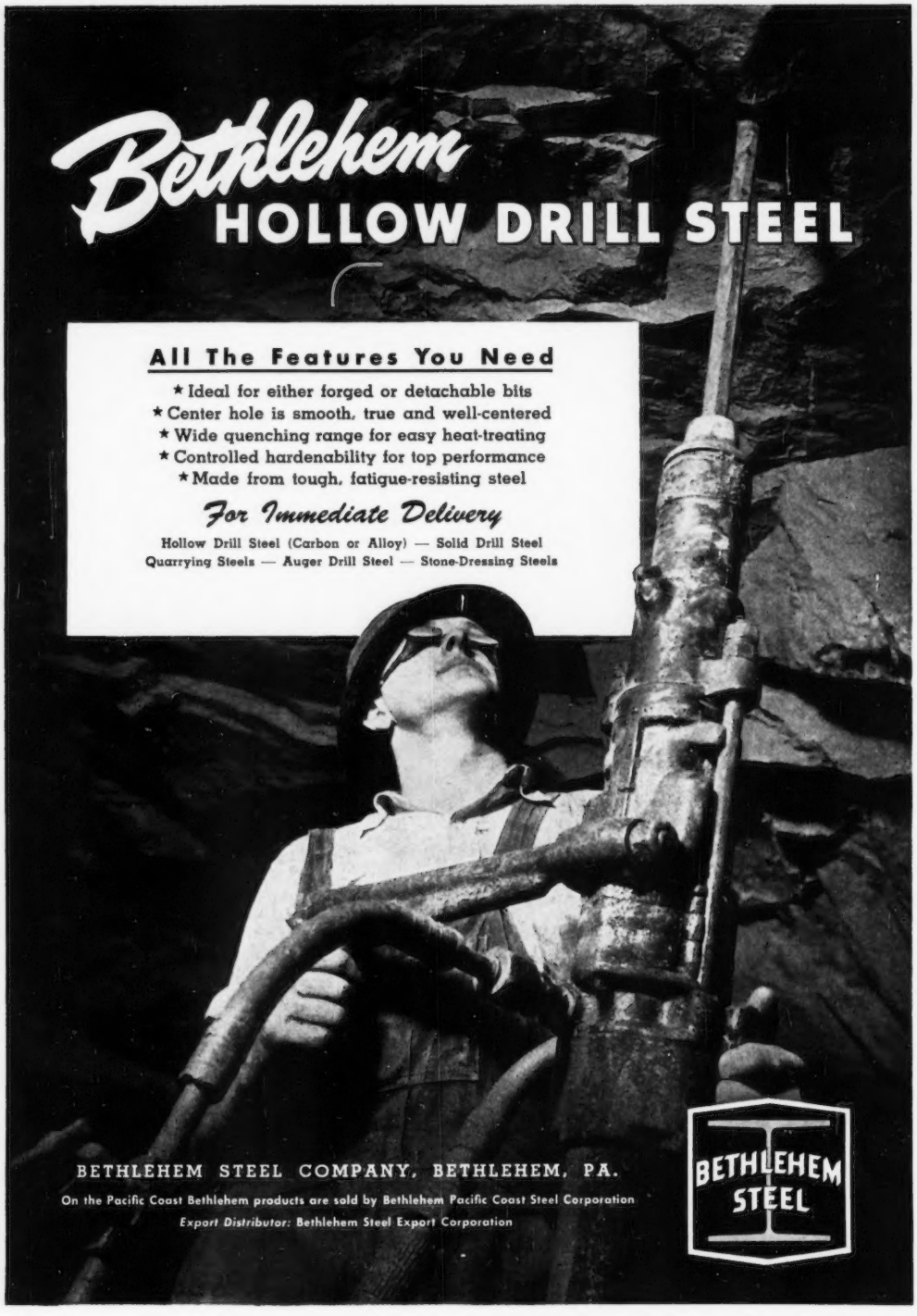
USS

UNITED STATES STEEL


Bethlehem
HOLLOW DRILL STEEL
All The Features You Need
★ Ideal for either forged or detachable bits
★ Center hole is smooth, true and well-centered
★ Wide quenching range for easy heat-treating
★ Controlled hardenability for top performance
★ Made from tough, fatigue-resisting steel
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Hollow Drill Steel (Carbon or Alloy) — Solid Drill Steel
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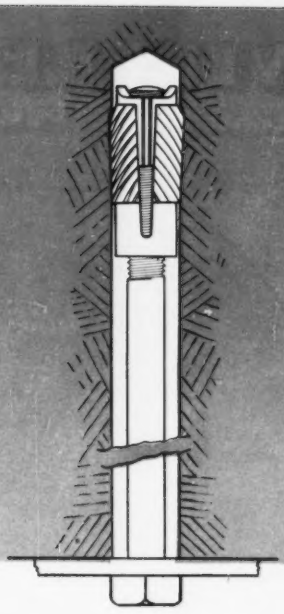
BETHLEHEM STEEL

# NEW

## O-B EXPANSION SHELL AND PLUG FOR ROOF BOLTING!



- Develops full tensile strength of ¾ and ⅝-inch bolts or rods.
- Has double the expansion of standard expansion shells.
- Quickly and easily installed.
- Expansion unit does not have to bear against top of hole.
- Used with bolts, allows bolt-head to be flush with plate--with rods, can be positioned to provide minimum roof projection.
- For complete information and installation instructions, just fill in the coupon below.

Ohio Brass MANSFIELD, OHIO

FOR MORE INFORMATION

8021-M

OHIO BRASS COMPANY, MANSFIELD, OHIO

I'd like further information on the new O-B Expansion Shell and Plug for roof bolting. Please send me a copy of bulletin 858-M.

Name .....

Title .....

Company .....

Address ..... Zone ..... State .....

City .....

# WILFLEY
centrifugal PUMPS

## ...Economical for
## SANDS, SLIMES, SLURRIES

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**Rubber and Metal Parts Interchangeable**

***Outstanding features of the*** WILFLEY pump include complete interchangeability of parts–from rubber to metal, or metal to rubber. Other exclusive features of design and construction, pioneered and developed by WILFLEY, give you stepped-up production, lower handling costs, and a proven dependability recognized by engineers all over the world. Wear parts are available in rubber, electric furnace iron and other materials individually engineered for every application. An economical size for every purpose. Write or wire for complete details.

A Companion
to the FAMOUS WILFLEY
Acid Pump

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Buy WILFLEY for
Cost-Saving Performance

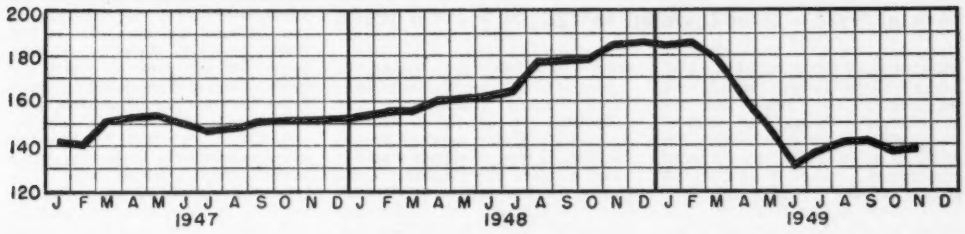
**A. R. WILFLEY & SONS, Inc.**
Denver, Colorado, U. S. A.
New York Office: 1775 Broadway,
New York City

# WILFLEY
centrifugal PUMPS

# E&MJ OUTLOOK

## E&MJ Weighted Index of Non-Ferrous Metal Prices

(100 is composite for 1922-3-4 of Copper, Lead, Zinc, Tin, Silver, Nickel, Aluminum prices.)




●

**MARKETS**

**November's mixed price pattern** surprised consumers and producers alike. Copper and zinc advanced, reflecting business optimism over the steel strike's end. Lead and tin declined. On balance, the E. & M. J. price index for November crept up to 138.18 from October's 137.81.

**Copper** is in the best position with the outlook strong for at least the next three months. Strikes have made **special high grade zinc** hard to get. **Lead is easier,** under heavy imports from dollar-seeking foreign producers. There's a rumor that the RFC might get into the **tin** sales business on a competitive basis.

**Deflation note:** Mercury is back to its prewar price, $71 a flask.

●

**LABOR**

**The heat is on Mine, Mill** in closing Carlsbad's three potash mines. With Christmas coming on, local wives miss that $2.05 an hour (average) pay check, the industry's highest scale. The men got pensions seven years ago, a pay increase is all that's left to ask for. Operators unite in saying it can't be done.

**Mine, Mill,** by the way, should leave the CIO before long, feet first. (See p. 91.) Metal mining might then become an unhappy hunting ground for militant unionists from Joe Stalin to John Lewis.

●

**AT HOME**

**Government stockpilers** were out, as November ended, discussing metal purchases for the first quarter of 1950. This could stiffen the lead market considerably, if they mean business.

**Hollinger and Hanna** developed Labrador's iron ore, but it will take nine companies to get it to market. Republic Steel, Armco Steel, National Steel, Wheeling Steel, Youngstown Sheet & Tube, have joined the Hollinger and the Hanna companies in financing the job. It may take $200,000,000 or more. (See E. & M. J., July, 1949, p. 88.) It's the biggest single development in mining's history.

**Inflation Note:** AEC has 200 lb. of uranium metal for sale to legitimate research projects. Price—$50 per lb.; in 1943 it was $7. Does this offer mean we have a surplus? AEC makes no comment.

●

**ABROAD**

**Venezuela may seek aid** from American and Canadian geologists if it decides to finance uranium exploration in the Guiana highlands.

Possibilities of **U.S.-financed steel industry** in Western Australia is being investigated. High grade hematite deposits on Koolan Island, and nearby coal look attractive but the steel export ban would bring the new enterprise up against a firmly entrenched combine.

# MARKETS—Trends and Prices

## Copper Advanced to 18½c. Basis—Prime Western Zinc Firm at 9¾c.—Lead Lowered to 12c., N. Y.—Tin Weak

THOUGH THE STEEL STRIKE has ended, a highly favorable development, work stoppages at New Jersey Zinc and the Aluminum Company of America, along with another unexpected curtailment in coal output have created some special problems for buyers and sellers of non-ferrous metals. The price pattern was irregular. The month turned out to be well above average in both copper and zinc, with demand active at higher prices. Lead continued to suffer because of liberal offerings of foreign metal at lower prices. The tin industry struggled with its immediate problem of returning to a more or less free market. As expected, the price of tin declined sharply. Despite irregularity in prices, the E&MJ index for November advanced 37 points to 138.18, largely because of higher copper and zinc.

The operating rate of the steel industry increased from 8.8% of capacity at the beginning of November to 87.7% as the month ended.

Industrial activity in October, based on the Federal Reserve Board's index, was higher than estimated a month ago, holding at 166% of the 1935-39 average. The revised figure for September was 175%.

### Copper at 18½c., Valley

Late on Nov. 3 the copper market learned that Phelps Dodge had raised its price to the basis of 18½c., Valley, a jump of seven-eighths of a cent. As there were no sales at the higher price on that day, the new quotation did not become effective until Nov. 4. All producers followed this move. That the price of copper would rise, following the general improvement in business, was accepted as a certainty. In fact, widespread rumors of a higher market undoubtedly inspired consumers to purchase the metal rather freely.

Sales of refined copper for November shipment to fabricators totaled 107,000 tons, an excellent showing. With a carry-over from October of several thousand tons, the industry is confident that domestic deliveries in November will come close to 110,000 tons. Deliveries in October amounted to 108,192 tons. Deliveries in the Jan.-Oct. period totaled 806,800 tons. Production of refined copper in the United States in the 10-months' period amounted to 868,914 tons.

Mine output of copper in the United States in September, the latest month for which figures are available, was equivalent to 58,379 tons, which compares with 55,850 tons in August, the Bureau of Mines reports. Mine output increased during October.

Statistics compiled for the fabricating division of the industry showed that 106,928 tons of copper was contained in products shipped to consumers, which compares with 114,760 tons in September. The decline was unexpected. In the ten months that ended with October, fabricators' customers asborbed 861,823 tons of copper, against 1,184,325 tons in the same period of 1948.

### Lead Returns to 12c.

The price of lead lost a full cent per pound during November, nothwithstanding deliveries to the stockpile and a fairly high level of consumption. The price of 12c. per pound, New York, established on Nov. 21, resulted in only a moderate improvement in demand. It was felt in some quarters that the new price, which returned the market to the low of the second-quarter period, would again speed up the buying movement. However, continued pressure of foreign metal in this market at price concessions made consumers limit their purchases to actual nearby requirements. As November ended it was possible to obtain foreign lead for shipment at around 11½c., duty paid, New York. Domestic producers, on the other hand, were inclined to accumulate some lead at 12c. They argued that consumers in many instances are reducing their inventories, and, on first indications of a more stable market they will rush sellers for substantial tonnages.

Total supply of lead (scrap, receipts of ore, and imports of refined) has been averaging between 95,000 and 100,000 tons a month. Consumption has averaged between 85,000 and 90,000 tons a month in recent months, according to preliminary estimates.

Import statistics for September revealed that 18,626 tons of pig lead arrived here, making the total for the Jan.-Sept. period 197,292 tons. The need for dollar exchange continued to divert large tonnages of foreign refined lead into this market. Imports of lead contained in ore, etc., in September amounted to 10,699 tons, bringing the total for the nine months to 80,599 tons.

### Flurry in Zinc

Demand for Prime Western zinc improved as soon as the steel strike ended. This development firmed up the market and at least three sellers jumped the price to 10c., East St. Louis. Other sellers did not share in the optimism and continued to sell freely at 9¾c. Weighted average prices for the days on which the metal sold at both levels did not move far away from the 9¾c. basis. Late in the month the market virtually returned to the 9¾c. basis. The threat of larger importations of slab zinc was a factor in limiting the advance.

Special High Grade zinc, used extensively in die casting, was particularly active, with consumers bidding for the reduced supply. Production in this grade has dropped from around 20,000 tons a month to 13,500 tons, owing to the strike at New Jersey Zinc Co. and reduced output at Bunker Hill.

### Tin Sharply Lower

With tin output in excess of requirements, at least until the United States again enters the field as a buyer

### Average Prices for November (E&MJ Quotations)

| | |
|---|---|
| **Copper:** | |
| Electrolytic, Domestic, Refinery | 18.062 |
| Electrolytic, Export, Refinery | 18.290 |
| **Lead:** | |
| Common, New York | 12.522 |
| Common, St. Louis | 12.326 |
| **Silver and Sterling Exchange:** | |
| Silver, New York, per oz. | 73.250 |
| Silver, London, pence per oz. | 64.000 |
| Sterling Exchange, "Checks" | 279.750 |
| **Zinc:** | |
| Prime Western, East St. Louis | 9.750 |
| **Tin:** | |
| New York, Straits | 91.190 |
| New York, 99% min. | (e)90.190 |
| **Gold**, per oz. U.S. price | $35.000 |
| **Quicksilver**, per flask | $71.870 |
| **Antimony**, (E&MJ) (d) | 35.280 |
| **Antimony**, bulk, Laredo | 32.000 |
| **Antimony**, in cases, Laredo | 32.500 |
| **Platinum**, Refined, per oz. | $69.000 |
| **Cadmium** (a) | 200.000 |
| **Cadmium** (b) | 207.500 |
| **Cadmium** (c) | 215.000 |
| **Aluminum**, 99% plus, ingot | 17.000 |
| **Magnesium**, ingot | 20.500 |
| **Nickel** (f) | 40.000 |

Domestic quotations, unless otherwise stated, are in cents per pound. Sterling exchange, checks, in cents. Quicksilver, per flask of 76 lb.

(a) Cadmium average based on the producers' quotation.

(b) Cadmium average based on the average of the producers' and platers' quotation.

(c) Cadmium average based on platers' quotation.

(d) Domestic, 5 tons or more but less than carload lot, packed in cases, f.o.b. New York.

(e) Tin contained.

(f) F. o. b. Port Colborne, U. S. duty included.

for its stockpile, consumers bought the metal only as needed. The Singapore and London markets declined, and the RFC lowered its spot New York quotation 10c. per pound during the month. (On Dec. 1 the RFC posted a price of 83c., a reduction of 2c. from the previous day's quotation).

The London Metal Exchange resumed trading in tin contracts on Nov. 15, as scheduled. Standard tin declined from £725 per long ton on Nov. 15 to £617 10s. on the last day of the month.

Consumers believe that the spot price of Straits quality tin in New York eventually will drop to approximately 75c. per pound.

Quicksilver remained on the inactive list and spot metal was available at $71 per flask. Imports from sources outside of the Cartel have been fairly liberal, which offset a restricted domestic output. Despite the fact that quicksilver is selling at prewar prices, consumers showed no interest in accumulating the metal.

Platinum was unsettled, but the leading interest continued to quote the market on wholesale lots at $69 per ounce troy.

Silver of foreign origin was firm at 73¼c. an ounce throughout the month.

Imports of manganese ore in the third quarter totaled 424,637 tons, an increase of 26% over the second quarter. Russia supplied 28,806 tons, India 123,218 tons, South Africa 103,771 tons, and the Gold Coast 99,303 tons. Scattered tonnages arrived from other countries.

*(Continued on page 89)*

## Major Metals

### U. S. DAILY AND AVERAGE PRICES

| Nov. 1949 | Electrolytic (a) Domestic | Copper (b) Export | Straits Tin New York | Lead New York | Lead St. Louis | Zinc East St. Louis |
|---|---|---|---|---|---|---|
| 1 | 17.325 | 17.550 | 95.000 | 13.000 | 12.800 | 9.575 |
| 2 | 17.325 | 17.550 | 95.000 | 13.000 | 12.800 | 9.750 |
| 3 | 17.325 | 17.550 | 95.000 | 13.000 | 12.800 | 9.750 |
| 4 | 18.200 | 17.550 | 95.000 | 13.000 | 12.800 | 9.750 |
| 5 | No Market | 18.425 | 95.000 | 13.000 | 12.800 | 9.750 |
| 7 | 18.200 | 18.425 | 95.000 | 13.000 | 12.800 | 9.750 |
| 8 | Holiday | 18.425 | Holiday | Holiday | Holiday | Holiday |
| 9 | 18.200 | 18.425 | 95.000 | 13.000 | 12.800 | 9.825 |
| 10 | 18.200 | 18.425 | 95.000 | 12.750 | 12.600 | 9.760 |
| 11 | Holiday | 18.425 | Holiday | Holiday | Holiday | Holiday |
| 12 | No Market | 18.425 | 95.000 | 12.750 | 12.600 | 9.760 |
| 14 | 18.200 | 18.425 | 95.000 | 12.750 | 12.550 | 9.750 |
| 15 | 18.200 | 18.425 | 95.000 | 12.750 | 12.550 | 9.750 |
| 16 | 18.200 | 18.425 | 95.000 | 12.500 | 12.300 | 9.800 |
| 17 | 18.200 | 18.425 | 95.000 | 12.500 | 12.300 | 9.775 |
| 18 | 18.200 | 18.425 | No quotation | 12.500 | 12.300 | 9.750 |
| 19 | No Market | 18.425 | No quotation | 12.500 | 12.300 | 9.750 |
| 21 | 18.200 | 18.425 | 85.000 | 12.000 | 11.800 | 9.750 |
| 22 | 18.200 | 18.425 | 85.000 | 12.000 | 11.800 | 9.750 |
| 23 | 18.200 | 18.425 | 85.000 | 12.000 | 11.800 | 9.750 |
| 24 | Holiday | 18.425 | Holiday | Holiday | Holiday | Holiday |
| 25 | 18.200 | 18.425 | 85.000 | 12.000 | 11.800 | 9.750 |
| 26 | No Market | 18.425 | 85.000 | 12.000 | 11.800 | 9.750 |
| 28 | 18.200 | 18.425 | 85.000 | 12.000 | 11.800 | 9.750 |
| 29 | 18.200 | 18.425 | 85.000 | 12.000 | 11.800 | 9.750 |
| 30 | 18.200 | 18.425 | 85.000 | 12.000 | 11.800 | 9.750 |
| **AVERAGES FOR MONTH** | | | | | | |
| Nov. | 18.062 | 18.290 | 91.190 | 12.522 | 12.326 | 9.750 |
| **AVERAGES FOR WEEK** | | | | | | |
| Nov. | | | | | | |
| 2 | 17.325 | 17.550 | 95.000 | 13.000 | 12.800 | 9.554 |
| 9 | 17.981 | 18.133 | 95.000 | 13.000 | 12.800 | 9.765 |
| 16 | 18.200 | 18.425 | 95.000 | 12.700 | 12.520 | 9.764 |
| 23 | 18.200 | 18.425 | 87.500 | 12.250 | 12.050 | 9.754 |
| 30 | 18.200 | 18.425 | 85.000 | 12.000 | 11.800 | 9.750 |
| **CALENDAR WEEK AVERAGES** | | | | | | |
| Nov. | | | | | | |
| 5 | 17.500 | 17.696 | 95.000 | 13.000 | 12.800 | 9.679 |
| 12 | 18.200 | 18.425 | 95.000 | 12.875 | 12.700 | 9.774 |
| 19 | 18.200 | 18.425 | 95.000 | 12.583 | 12.383 | 9.763 |
| 26 | 18.200 | 18.425 | 85.000 | 12.000 | 11.800 | 9.750 |

## Silver, Gold and Sterling

### DAILY AND AVERAGE PRICES

| Nov. 1949 | Sterling Exchange "Checks" | Silver (c) New York | Silver (c) London | Gold London | Gold (d) United States |
|---|---|---|---|---|---|
| 1 | 279.750 | 73.250 | 64.000d. | 248s. | $35.00 |
| 2 | 279.750 | 73.250 | 64.000d. | 248s. | 35.00 |
| 3 | 279.750 | 73.250 | 64.000d. | 248s. | 35.00 |
| 4 | 279.750 | 73.250 | 64.000d. | 248s. | 35.00 |
| 5 | *(e)* | *(e)* | *(e)* | *(e)* | 35.00 |
| 7 | 279.750 | 73.250 | 64.000d. | 248s. | 35.00 |
| 8 | Holiday | Holiday | 64.000d. | 248s. | Holiday |
| 9 | 279.750 | 73.250 | 64.000d. | 248s. | 35.00 |
| 10 | 279.750 | 73.250 | 64.000d. | 248s. | 35.00 |
| 11 | Holiday | Holiday | 64.000d. | 248s. | Holiday |
| 12 | *(e)* | *(e)* | *(e)* | *(e)* | 35.00 |
| 14 | 279.750 | 73.250 | 64.000d. | 248s. | 35.00 |
| 15 | 279.750 | 73.250 | 64.000d. | 248s. | 35.00 |
| 16 | 279.750 | 73.250 | 64.000d. | 248s. | 35.00 |
| 17 | 279.750 | 73.250 | 64.000d. | 248s. | 35.00 |
| 18 | 279.750 | 73.250 | 64.000d. | 248s. | 35.00 |
| 19 | *(e)* | *(e)* | *(e)* | *(e)* | 35.00 |
| 21 | 279.750 | 73.250 | 64.000d. | 248s. | 35.00 |
| 22 | 279.750 | 73.250 | 64.000d. | 248s. | 35.00 |
| 23 | 279.750 | 73.250 | 64.000d. | 248s. | 35.00 |
| 24 | Holiday | Holiday | 64.000d. | 248s. | Holiday |
| 25 | 279.750 | 73.250 | 64.000d. | 248s. | 35.00 |
| 26 | *(e)* | *(e)* | *(e)* | *(e)* | 35.00 |
| 28 | 279.750 | 73.250 | 64.000d. | 248s. | 35.00 |
| 29 | 279.750 | 73.250 | 64.000d. | 248s. | 35.00 |
| 30 | 279.750 | 73.250 | 64.000d. | 248s. | 35.00 |
| **AVERAGES FOR MONTH** | | | | | |
| Nov. | 279.750 | 73.250 | 64.000d. | — | 35.00 |
| **AVERAGES FOR WEEK** | | | | | |
| Nov. | | | | | |
| 2 | 279.750 | 73.250 | | | |
| 9 | 279.750 | 73.250 | — | — | |
| 16 | 279.750 | 73.250 | — | — | |
| 23 | 279.750 | 73.250 | — | — | |
| 30 | 279.750 | 73.250 | — | — | |

Calendar week averages, New York Silver: Nov. 5th, 73.250; 12th, 73.250; 19th, 73.250; 26th, 73.250.

*(e)* No market (Saturday).

THE above quotations for major non-ferrous metals are our appraisal of the important United States markets, based on sales reported by producers and agencies. They are reduced to the basis of cash, New York or St. Louis. All prices, except gold and silver, are in cents per pound.

*(a)* Net prices at refineries on Atlantic seaboard. To arrive at the delivered New England basis add 0.300c. per pound, the average differential for delivery charges.

*(b)* Our export quotation for copper reflects prices obtaining in the open market and is based on sales in the foreign market reduced to the f.o.b. refinery equivalent, Atlantic seaboard. On f.a.s. transactions we deduct 0.075c. for lighterage, etc., to arrive at the f.o.b. refinery quotation.

Copper, lead and zinc quotations are based on sales for both prompt and future deliveries; tin quotations are for prompt delivery only.

Quotations for copper are for the ordinary forms of wirebars and ingot bars; cathodes are sold at a discount of 0.125c. to 0.15c. per pound.

Quotations for zinc are for ordinary Prime Western brands. Zinc in New York commands a premium over the St. Louis basis equal to the freight differential. Contract prices for High Grade zinc delivered in the East and Middle West command a premium of 1c. per pound over the current market for the Prime Western; Special High Grade 1 and 1½c., depending on seller.

Quotations for lead are for common lead. Corroding lead commands a premium of 10 points.

*(c)* The daily New York silver quotation reported by Handy & Harman is for silver contained in ores and other unrefined silver-bearing materials, in cents and one-eighth cent fractions per troy ounce. It is determined by Handy & Harman on the basis of actual sales of bar silver .999 fine in amounts of 50,000 ounces or more for nearby delivery at New York, and is usually one-quarter cent below the price paid for such bar silver, this deduction being the allowance for carrying, dlivering, and marketing. In addition to foreign silver, the quotations also apply to domestic and Treasury silver if such silver enters into the New York market.

The Treasury's purchase price of newly mined domestic silver 90.5c. per troy ounce 1000 fine, effective July 1, 1946. London silver in pence per troy ounce, basis .999 fine.

*(d)* U. S. Treasury's gold price. Actual payment by the United States Treasury for gold is at 99.75 per cent of the price quoted by the Treasury, which is equal to $34.9125.

# Behind the By-Lines...

G. P. Lutjen

» This month's feature, "Can Uranium Mining Pay?" or "Through Darkest Colorado with Camera and Counter," is an accurate picture of the problems faced by U. S. uranium miners and how they are solving them. To get the facts for this story, **Al Knoerr** went into more uranium mines than Uncle Gus did saloons on payday night. What is going on at those mines is clearly and concisely reported. If you are a would-be uranium miner, here is the answer to your question, "What's there in it for me?"

On this assignment, Al Knoerr not only had to put up with the ubiquitous smog of Government security, but also with an accumulation of carnotite samples whose every film-fogging little gamma ray did its utmost to ruin the swell photographs he got. But don't take our word for all this—turn to page 64 and see for yourself.

"Could the Treasury Raise the Price of Gold Overnight?" is the question before the house on page 72. We have been belabored by two schools of thought. One claims the Treasury would if it could but it can't while the other argues it could if it would but it won't. All of which makes it a good time for **Herbert M. Bratter**, who knows about these things, to step in with the answer. It may or may not help you sleep any better, but at least you'll know how the situation stands.

» **The skeleton-in-the-closet** division pops up to haunt us in this issue. The report on the minerals industry's labor negotiations in 1949 is definitely cause for reflection. **Jim Richardson's** article, "Mining's Labor Relations Give No Cause for Pride" (p. 78) should not be considered strictly as a condemnation however, but more as a call for enlightened action on the part of management.

Mr. Richardson needs no introduction to mining men. His fine work in reducing Climax Molybdenum's accident record to midget proportions, is a milestone in safety engineering. He has a fine record as Chairman of the Minerals Division of the National Safety Council and as Secretary of the Tri-State Zinc and Lead Ore Producers Association. At present he is manager of the Utah Mining Association.

» **A story on** Parkes Process crusts may sound like something out of the South Brooklyn Bakers Annual, but any metallurgist will gladly inform you that the subject deals with the residues produced by the desilverization of lead bullion. This particular article, we will gladly inform you, is a report on experimental work carried out at the Missouri School of Mines and Metallurgy. Smeltermen will be interested to learn that results point to a cheaper, easier way to treat Parkes Process crusts.

Authors of this fine job are **A. W. Schlechten** and **C. H. Shih.** There is no need for us to speak of Prof. Schlechten's contributions to metallurgy. Everyone knows that. But did you know that back in student days he sang a mean bass in the glee club? At least that's how it was reported to us by a former client of Vincent's Basement ("Benny sent me") in Meadville.

» **As a clearing house** for good ideas, E&MJ has been in business for a long time. Here's one way it works. A news item a while ago mentioned an extractor for removing stuck drill steel. **T. W. Greenhill, manager** of Paringa Mining and Exploration Co., Ltd., in Australia, wrote in for further information. We contacted **A. H. Wohlrab, general manager of Calumet & Hecla,** who very kindly released the drawings and information for the benefit of Mr. Greenhill and, through Operating Ideas, other mine operators.

The palm for mechanical ingenuity this month, goes to **G. L. Saunders** of Toronto, Canada. His design of a bottom dump skip (p. 96), will be of more than passing interest to mining men everywhere. By eliminating complicated dumping mechanisms, you can now have your choice of stubbier head frames or deeper ore-bins.

Mr. Saunders is a director of Aerofall Mills Ltd., whose new crushing-grinding unit (E&MJ, April, 1949, p. 112) has caused such a stir recently in milling circles.

» **To help busy** mining men keep up with industrial developments outside of their own field, this department, as part of its service (?), will occasionally present brief reports from the national industrial scene. Here is the first.

**Moonshine.** East and Middle Tennessee moonshine differ as much in quality as do fine Kentucky bourbon and lighter-fluid. That is the opinion of men who ought to know—the State revenue agents, as quoted in the *Nashville Banner.* It seems midstate producers go in for mass production while the eastern brethren strive for quality. "Black pot" stills of sheet metal are used in the former area. Locally these are called "groundhogs" or "Alabamas" and are said to turn out "terrible" stuff. In the East Tennessee mountain areas more conventional copper stills are used, resulting in a tastier output of "squeezins".

**Be sure you don't miss**...a new gadget that automatically controls the rate of feeding chemicals into a stream (p. 101)....how to save money by trimming churn drill bits with rock drills (a two-bit idea on p. 94)....the dope on New Zealand's lead producer, Te Aroha (p. 135)....report on happenings at El Paso's International Mining Days celebration (p. 92).... and the list of E&MJ reprints available (p. 142).

» **Apparently our** individual headaches as well as our collective non-ferrous headache, are just another statistic to the Government. The U. S. Tariff Commission reports, "*The production of acetylsalicylic acid (aspirin) amounted to* 11 *million pounds in* 1948."

ENGINEERING AND MINING JOURNAL

DECEMBER, 1949

# Strike A Blow For Free Enterprise

IF WE WANT a free democracy, the time has come to strike a blow to unshackle venture capital.

All over the world we see the forbidding spectacle of governments gradually but inexorably encroaching upon private enterprise. By tax burdens, operated under the concept that profit is antisocial, the fountain-head of free private enterprise, investment of venture capital, is being dried up. Labor organizations, with their masses of votes to which no politician can be antipathetic, are teaming up with government to squeeze the profit out of industry, thus strangling the will to invest and jamming the mechanism by which new jobs are created. Not only is this true; even established industrial equities are unpopular. This is shown by the fact that stock exchange prices have failed to reflect the pronounced inflation of recent years, and stocks are available at what must be considered bargain prices if one has faith in the future of private industry.

Does this mean that people all over the world are making a conscious choice of bureaucratic management of their economic affairs? We think not. Offerings by politicians of pie in the sky seem to spring from such prolific and remote sources that ordinary citizens cannot perceive how they are simply being bribed with their own money and swindled by a continuous inflationary process. The average citizen the world over, in our opinion, wants free democracy and that economic system which will deliver him the greatest material benefits, one based on private enterprise.

This system cannot function to any advantage and in the long run cannot survive without adventurous capitalists who are willing to assume the extraordinary risk of creating new jobs in new industrial activities. But with the hazards imposed by taxes, labor's demands of today, and a government-labor coalition against investors, the financing of new ventures is a mathematical absurdity. Today if the motive is profit alone, not the love of creating something worthwhile, betting on the horses looks like a better risk than a new industrial venture.

The drying up of venture capital is an ominous development, not only for the capitalist, but for the workman who has a stake in a maximum number of jobs and for the politician who has to find new sources of wealth on which to levy mounting tax burdens. If voluntary venture capital is discouraged and fails to provide the necessary new enterprise to maintain an expanding productivity, the government will have to step in and finance new developments.

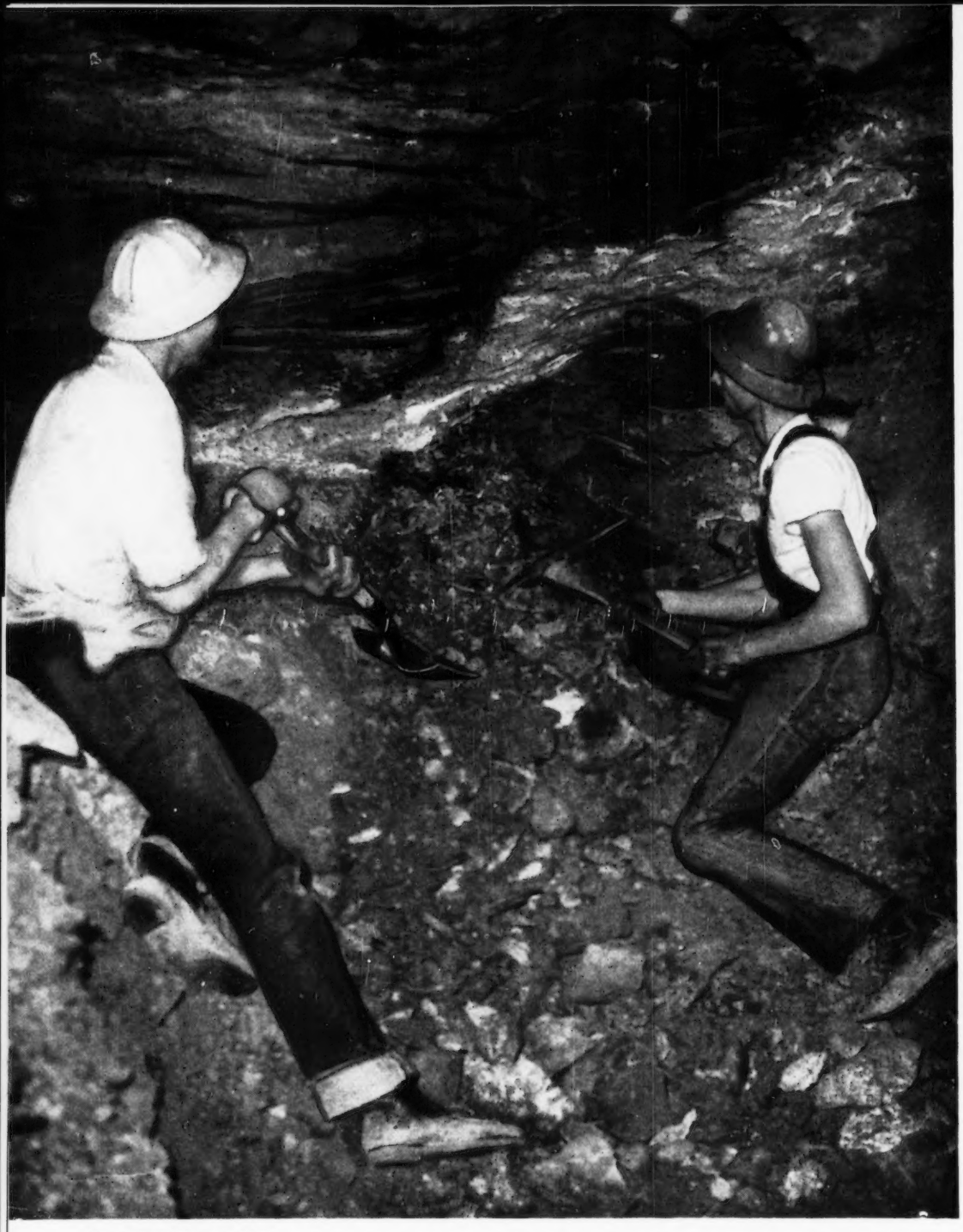
What is the remedy for this disease? What will coax capital, large or small, away from safe deposit boxes and coupon clipping into the venture field? Simply giving it a run for its money, a chance to win when a victory is gained over the natural hazards of the new enterprise, by tax exemptions for new enterprises for a limited period of time, such as five years, plus a more liberal attitude toward investors.

We are convinced that, if politicians and Treasury officials would have the courage to take this step, the tax revenues of government would be increased in ten years to an extent that would overtake prior losses and place tax revenues on a broader, firmer base. If this or some equivalent step is not taken, we shall simply have continued creeping socialism and a leaf-raking future.

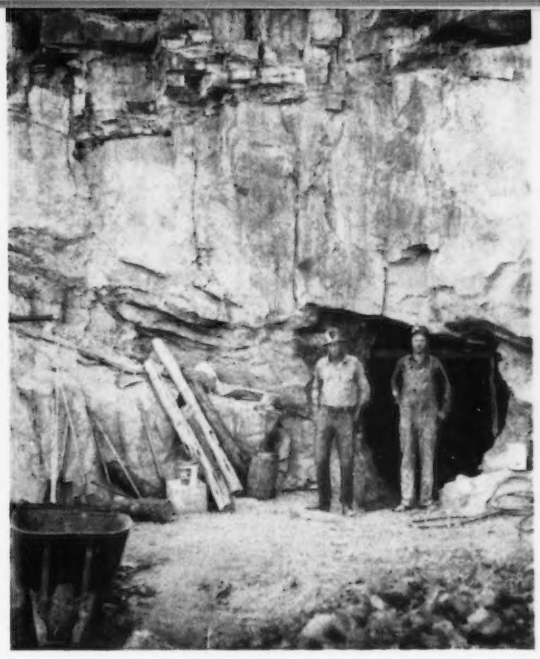
The mining industry, exploiting depletable resources, has a particular dependence on venture capital. The picture of a declining domestic mining industry which has been conjured up so often would be radically changed if investors were more adventurous.

We believe that the time is ripe to strike a blow for liberty, and for the mining industry in particular, by making a drive for incentives to venture capital, a five-year tax exemption for the new mining enterprise and other measures to encourage new investment. We think a surprising amount of receptivity would be found to such proposals in Washington, both in Congress and the Administration. Thinking men everywhere are realizing that the choice between free enterprise and socialism must be made soon, otherwise the private enterprise system will be so weakened that its inherent virtues will be overlooked for our time.

Let's strike that blow, and do it now!



**URANIUM MINE.** L. V. Hill and Leo Hill, miners of Dolores, Colo., expose a typical carnotite vein in a slope mine. Their chief problem is to stay with the vein, which thickens, thins, weaves; and to find it again if it pinches out.



**RIM ROCK MINES.** Cliff and Ben Brewer, of Dove Creek, Colo., coming off shift at a small mine at left. Miners Lee Hemphill and Dave Lynn and foreman A. H. Canfield, at right, haul out typical equipment.

# Can Uranium Mining Pay?

A. W. KNOERR
Associate Editor

TO FIND URANIUM MINERS at work in typical operations in the Colorado Plateau area, you will generally have to follow a pair of ruts that veer off into nowhere from some dusty county road. The ruts will wind around dry washes and boulders, then up the sides of canyons to end abruptly at diggings near the rim of a canyon, or just over it. Here the miners, generally working in pairs, will shut off a jackhammer or drop a wheelbarrow to show you around. What you will see is described and illustrated in this article, based on a number of such visits plus numerous talks with operators, engineers, metallurgists, geologists, managers, Atomic Energy Commission officials and others acquainted with the area.

All of these visits and interviews were aimed at one target—the answer to the question, "Can uranium mining pay in the Colorado Plateau area?" The answer is vital because our Government needs a strong domestic uranium mining industry, and the Colorado Plateau is the best potential domestic source. Furthermore, AEC has specifically said that these ores can best be produced by private enterprise operating on a profit motive.

Offhand, the following trends indicate that mining does pay. 1. Outside parties are showing increased interest in the area. 2. New responsible financial and mining interests are buying up claims and leasing or optioning others. 3. Ore output is increasing "satisfactorily" under assistance and incentives now offered by AEC. 5. Equipment men in the area report definite improvement in payments made by small operators acquiring machinery on a rental-option basis.

The foregoing indications are offset in part by these: 1. Turn-over in small operators is heavy. 2. Haulage costs are high. 3. Discontinuous and irregular ore deposits boost exploration, mining and development costs. 4. Large-scale operations are exceptional in the area.

Since there is an area of doubt, let's see what the operators are up against and how mining costs compare with ore values.

## The Uranium Country

Uranium deposits of the Colorado Plateau are distributed over an area approximately 200 miles in diameter. (See map.) Steep canyons of the San Miguel and Dolores Rivers and their tributaries cut through the heart of the Plateau which ranges in elevation from 5,000 to 7,500 ft. Secondary roads over which most of the ore has to be hauled are only fair. Trucks sink to the hub-caps in wet weather. Haulage is further complicated by the fact that most mines are situated on the rims of canyons. Mine supplies and ores have to be hauled over steep rough access roads from mines to secondary roads in the canyons, or over long round-about routes on plateaus. One operator pointing to a rim-rock property which seemed only a stone's throw

**HEART OF THE PLATEAU.** Canyons of the Dolores and San Miguel Rivers and their tributaries cut through the heart of the Colorado Plateau. The thick, white sandstone exposed is a key bed, the Slick Rock member of the Morrison formation which can be traced for miles along the walls. Uranium mines are uniformily 250

from a good road in the canyon below, said he had to haul equipment and supplies over 30 miles to reach his property. Thus long ore hauls, averaging 60 to 80 miles, most of them over poor to fair roads, contribute to high costs.

Despite heavy snows which bogged down production last winter, and occasional flash floods, the climate is definitely on the arid side. Water to operate drills and cool compressors often has to be hauled many miles.

## Geology

Much has been written on the geology of the area, especially by such capable men as R. P. Fischer of the U. S. G. S., who now heads the geological work being done at AEC Grand Junction project. Consequently we focussed our inquiries chiefly on the geologic clues that aid in discovering new ore deposits or extending old ones. The following sketch of the geology of the area will help in understanding the value of these clues and the problems of operators.

Carnotite and roscoelite ores occur in small tabular or lenticular deposits impregnating the Morrison sandstone and Entrada sandstone of Jurassic age and the Shinarump conglomerate of Triassic age. As chief interest today is centered in the Morrison carnotite deposits because the uranium content is greater, discussion is limited to those deposits. The Morrison sandstone member containing the carnotite deposits is lenticular, sometimes as thick as 50 ft., and interbedded with mudstone. Orebodies tend to distribute themselves along vaguely-defined trend lines or channels. Carnotite orebodies are generally small; any deposit producing more than 10,000 or 20,000 tons would be considered large. The orebodies do not follow the bedding in detail, having a tendency to thicken and thin and roll. Thickness varies from a few inches to five or six feet. In a few areas veins occasionally widen to 10 to 12 ft. Often the "veins" swing up or down violently and pinch out. Sometimes

to 300 ft. higher (see arrow) on the rims of canyons or just beyond under shallow overburden. Access roads from rims to roads in canyons are rugged. Haulage is a major problem. Water is scarce, and has to be hauled for miles to operate drills and cool compressors. Despite these difficulties, ore production is increasing satisfactorily under present incentives, according to AEC.

they reappear a few yards away.

Carnotite occurs as a soft cementing material. Sand grains are barren. Grade of ore averages about 0.25% $U_3O_8$ and slightly less than 2% $V_2O_5$. Values of shipping ores range from $15 to $30 per ton. However, individual deposits run much better than this.

In R. P. Fischer's recent pamphlet, "Federal Exploration for Carnotite Ore," these practical clues are listed to assist in finding ore:

1. Ore deposits occur in the thickest parts of the favorable members of the Morrison formation. Beds of sandstone less than 20 ft. thick rarely contain valuable deposits.

2. Deposits often follow vaguely-defined trend-lines conforming to stream channels in the beds. Once a trend becomes apparent, additional deposits may often be found by projection of drilling or exploration work along these lines.

3. Sandstones in the thicker central parts of beds are dominantly medium-grained, while those in the less-favorable thinner parts of the beds are dominantly fine-grained.

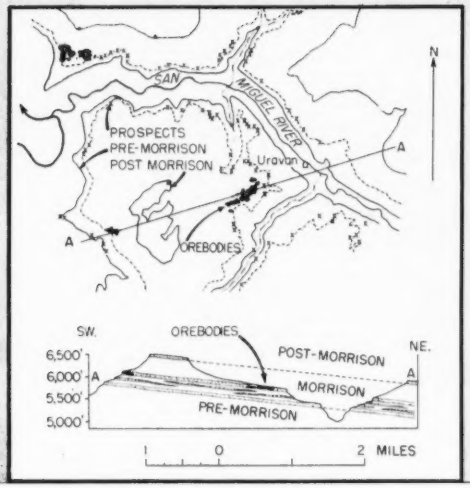
4. The color of ore-bearing sandstone is dominantly pale to light yellow-brown and speckled with limonite stains, while sandstone which is whitish to pale yellow-brown or that which is reddish brown contains few deposits.

5. Interbedded mudstones are normally red. Near the ore deposits, however, the mudstones within the ore-bearing sandstone are altered to grey, also the upper few inches to few feet of the mudstone beneath the ore-bearing sandstone member.

The foregoing aids used singly may be misleading but should be helpful if used together and with judgment. Engineers and operators in the field also mentioned these guides:

1. Uranium ores generally occur 250 to 300 ft. above the Slick Rock member of the Morrison formation which outcrops as an easily identifiable thick white bed. It can be traced for miles along the walls of canyons in the Uravan-Naturita

COLORADO PLATEAU AREA is about 200 miles in diameter. Mining is now confined to carnotite ores. Vanadium Corp. of America is working on new porphyry and copper-uranium ores in Utah.




SECTION THROUGH URAVAN AREA shows typical carnotite deposits. Map and sections after illustrations in "Federal Exploration for Carnotite Ore," by R.P. Fischer of U.S. Geological Survey.

area and westward. (See illustration.)

2. If depth of overburden increases appreciably, chances for finding vein extensions diminish. This may happen when a vein dips steeply, or when rim-exposed veins extend below successive steps of overburden receding from the rim. If either situation develops, some experienced operators quit looking for vein extensions.

3. Geiger counters are handy instruments and everywhere in evidence. Although sensitivity of most counters is such that you have to get within a few feet or inches of a sample to get a "kick," the counters are helpful in determining grade of ore and scanning ore faces.

4. Carnotite ores are not difficult to identify with the naked eye. "If you can detect the slightest sign of canary yellow, you probably have a good shipping ore," remarked one mine manager.

## Exploration

To stimulate ore production in the area, the U. S. Geological Survey, working on behalf of the AEC, is conducting an intense exploration campaign. Work is confined mainly to wildcatting in areas where private enterprise could not afford the risk. During the period 1947 to September, 1949, Government drilling totaled approximately 285,000 ft. Future plans call for drilling at the rate of about 400,000 ft. per year, about half of which will be supervised by U. S. G. S., the remainder by the AEC direct.

Exploration in new areas is carried out in three stages: 1. Drilling for geologic information, with holes spaced at 500 to 1,000 ft. If trends are disclosed, these are investigated also. 2. In favorable ground ore deposits are sought with holes put down at 200-ft. intervals. 3. Ore deposits are outlined by holes drilled at 50-ft. intervals. This system has worked well, and as a result the Government has defined mineral deposits available for leasing and production by private operators.

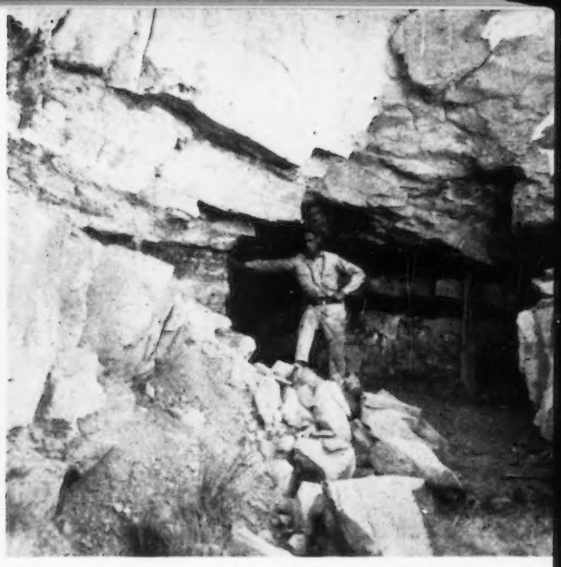
Nearly all drilling to date has been done with diamond drills, but recently Minerals Engineering Co., of Grand Junction, has introduced wagon-drill equipment which can put down 60 to 70-ft. holes. This innovation should aid exploration considerably. R. Sullivan of Minerals Engineering reported in February, 1949, at Denver that core-drilling costs were about $1.80 per foot and that he hoped to reduce these to less than $1 with new methods. Jackhammer drills have also been useful to a limited extent. At first diamond-drill holes were cored all the way. Later after the geologic picture had been worked out, some of the deeper holes were started with rotary drills. After a favorable bed had been reached, the holes were cased and completed with core drills at an appreciable saving in cost. Water is scarce in the area and frequently has to be hauled 8 to 10 miles. In fractured areas where water consumption is high, costs go up also.

One engineer familiar with many of the small operations in the area said that the "crying need of the district" is a portable exploratory drill rig which can put down holes 40 to 45 ft. at a cost of 50c. per foot instead of $1.50 to $2 for diamond drilling. This, he said, would enable the operators of small mines starting in on the rim rock to drill through the overburden ahead of them and probe for extensions of the deposits as cheaply as possible. To some extent, jackhammers have been used for this purpose, but when the holes reach a depth of 25 ft. the air pressure fails to lift cuttings satisfactorily. Here again it has been suggested that some kind of air pressure booster or regulator be devised so that cuttings can be cleared out under increased pressure as the holes go deeper.

## Typical Mines

Right now production in the area is being maintained by several hundred operations, most of them small (287 on July 1, 1949). These can be classified roughly into rim-rock mines and shaft mines. Because the deposits thicken and thin, roll, and pinch out, 60% of the mine production comes from development work in both types of mines. Fortunately the back is generally strong, requiring only an occasional stull or pillar. The toughest prob-

GEIGER COUNTERS are handy instruments for determining rough value of ore and specimens. Needle above swings half-way across dial when instrument is held over rich carnotite sample from area.



TYPICAL RIM ROCK carnotite outcrop is pointed out here by Henry Hollings, foreman of AEC mine near Slick Rock, Colo. This mine is equipped with cars, track and ore bin. See page 94.

lem is to stay with the vein or pick it up again once you have lost it.

In starting a rim-rock property, the operator usually mines out an exposed pocket or two and then goes underground with a sort of adit, mining to the left and right for about 10 ft. to pick up exposed ore. Long-hole drilling with jackhammers often reveals extensions of ore. The veins have a habit of rolling and may be shoulder high in one round and below your feet a few rounds later. That is why it is best to start mining 2 or 3 ft. below the vein and keep the bottom of the drift that way. Then if the vein goes down, it can be underhanded without too much difficulty. If the vein takes a steep roll down or up, it usually pinches out. Typical drift rounds at one mine were 5x7 ft., contained 14 holes, pulled 5 ft. deep. An average round yields about 10 tons of shipping ore per round. Another operation having six miners and a foreman produced 10 to 20 tons per day. Mining costs were about $15 per ton.

Drilling is generally done with jackhammers, Jacklegs or Stoper-leg drills. The latter types can be used for sinking, drifting, stoping and raising. Miners become quite adept at using these all-purpose drills. Mucking is generally done by hand. Ore is hauled into wheelbarrows more often than not, undoubtedly because the ore deposits lend themselves to a certain type of gophering wherein galloping drift bottoms preclude track haulage. Nevertheless, with a little careful planning track haulage is definitely possible and more economical. In some operations miners were mucking off the rough, and undoubtedly such elementary aids as steel muck sheets would have saved time and effort.

Ore is often wheeled out of the mine, dumped on piles to be reloaded by hand to trucks. In better-planned operations, haulage roads are brought in about 50 ft. below the mine level. In this way ore can be hauled out of the mine by track, dumped into a bin, and loaded into a truck without re-handling.

Shaft mines are operated in areas where diamond drilling has exposed ore 50 to 75 ft. below the surface and away from the rims of mesas. Inclined shafts or slopes are sunk rather than vertical shafts because they are cheaper to sink and require less power for hoisting ore. Once the ore has been reached, the same mixed mining and development method used in rim-rock operations is followed.

In one model operation visited, the ore was hauled out in mine cars by a small gasoline driven hoist mounted on a tipple over a steel ore bin. Miners were working on ore faces under electric lights. Power was supplied by a Delco lighting unit.

One pattern for successful mining in the area seems to be the joint operation of a group of small mines by a single company. Here the small properties might be regarded as a number of widely separated stopes. Expensive equipment like bulldozers and trucks necessary to build access roads and open up ore exposures can be shared in common. Supervision and engineering work can also be spread over the group as a whole. Portable equipment like compressors and loaders for trucks can be shifted about as needed. This system also permits standardization of equipment, central repair shops, and more economical purchasing programs. Unquestionably this logic is at the bottom of inquiries and applications for more leases or attempts to option more properties by some operators now active in the area.

In summary, it might be said that at present the area is being high-graded through easily accessible orebodies. When these are exhausted, more ingenuity will have to be exerted to mine at depth, and certainly more mechanical equipment will be required per ton mined than today.

With the foregoing information as a background, let's turn our attention again to the opening question of this article: Can mining be done at a profit here? As uranium is the chief product sought, and as its price is strictly a matter of Government control, we can only conclude that the AEC has within its grasp the power to turn production in the area on and off like a water valve simply by manipulating price schedules.

The best way to appraise AEC's

MODEL SLOPE MINE. Back from the rim, miners go underground with inclined shafts. This mine, near Bishop Canyon, is equipped with track haulage, electric lights underground, Delco power plant, steel ore bin, and gasoline tugger hoist over ore bin.

buying policies designed to stimulate ore production is to study significant details in the ore-buying schedules. And in doing this note that the schedule originally announced in April, 1948, has not been inflexible. As pressing problems of producers became acute (and operators and the press are extremely vocal in this area) schedules were progressively liberalized in favor of producers.[1] Producers are still not satisfied as well might be expected, but neither is AEC disposed to toss Uncle Sam's money around carelessly. Nevertheless the valve of production is steadily being opened in the area.

Here are some of the significant items in the Plateau ore-buying schedules:

**Guaranteed Minimum Prices.** No prudent investor would feel secure in financing equipment and development work if he feared sudden stoppage of uranium buying or a violent cut in prices. So AEC established a three-year guaranteed minimum price in April, 1948 (60.3), and later extended this plus other bonuses to June 30, 1954 (60.5). In this respect uranium producers are much better off than base metal producers who do not know where prices will go in the next five years.

**Development Allowance.** As pointed out, about 60% of the ore mined is a product of development work. Realizing that development costs are unusually high in the Plateau area, AEC offered a development allowance of 50c. per lb. $U_3O_8$ for ores assaying 0.20% $U_3O_8$ or more. This was later extended to apply to ores as low as 0.10% or better (60.5). On an ore assaying 0.25% $U_3O_8$ the development allowance amounts to $2.50 per ton of ore. The intent of this provision is that development allowances should be spent for development work, and large producers (1,000 tons or more per year) will be required to submit proof of such expenditures.

**Haulage Allowance.** Haulage is costly and an obvious problem in the area. AEC has met this in part by establishing five ore-buying stations at plants in convenient locations, and by awarding a 6c. per ton-mile haulage allowance with a 100-mile maximum effective until June 30, 1954. Much difference of opinion on haulage costs exists. On rough access roads, 8 to 10c. per ton-mile seems to be the average cited, and on long hauls on main highways 5 to 7c. AEC's figure is based in part on experience records of operators' test hauls and experience records of major truckers in the area. Engineers and shippers in the area say that 6c. is too low and that many of the truckers do not know how to figure their costs. Many underestimate high depreciation rates due to rough roads. At any rate, 6c. goes a long way to defray shipping costs and the trucks are still rolling in the area.

**High-Lime Ores.** Appreciable tonnages of high-lime ores are available in the Plateau area, particularly from the southern portion, but the presence of lime interferes with the recovery of vanadium. As prices paid for ores are based on vanadium recovery as well as uranium recovery, price schedules now in effect give the buyer rights to reject ores containing more than three parts of lime to one part of $V_2O_5$, or a total of more than 6% lime in the ore. Reason seems to be that in the salt-roast, acid-leach process used to recover vanadium, the vanadium forms an insoluble calcium vanadate during the roasting process instead of a soluble sodium vanadate. AEC's Monticello plant is working on a recovery process for high-lime ores and has relaxed restrictions on lime ores somewhat.

The lime problem is a subtle one not completely understood. Two ores containing an equal percentage of lime may not respond equally well to treatment. Therefore, shippers to the Monticello plant may send in a 40-ton representative shipment of ore for an amenability test. Contracts are later drawn based on results of the test. As uranium recovery is not affected by the lime, penalties are levied against vanadium content.

**Uranium Payments.** Present schedules pay for uranium on a sliding scale which amounts to 50c. per lb. $U_3O_8$ for 0.10% ore and gradually increases to $2 per pound $U_3O_8$ for 0.20% ore. Addi-

[1]For full details see circulars 60.3, 60.4 and 60.5 of AEC's domestic uranium buying program, available at AEC offices in Grand Junction, Colo., and New York.

tional premium of 25c. per pound is paid for each pound in excess of 4 pounds $U_3O_8$ per ton, and an additional 25c. per pound premium for each pound in excess of 10 pounds $U_3O_8$ per short ton. Obviously all of this is to encourage the production of high-grade ores. The lower limit of 0.10% has been set to encourage sufficient production of ores of average grade necessary to run plants at peak efficiency.

**Vanadium Payments.** $V_2O_5$ is paid for at the rate of 31c. per pound up to but not exceeding 10 lb. of $V_2O_5$ for each pound of $U_3O_8$. The latter specification is not rigid, however, and under special cases producers may get paid for excess vanadium if the private vanadium processing plants choose to accept the ore. One producer shipping to a privately-run plant said that if his ores exceeded the 10:1 ratio at times, he was permitted to average out his shipments on a periodic basis and thus get paid for all of the vanadium.

**Example.** Here is what an ore assaying 0.25% $U_3O_8$ and 2.0% $V_2O_5$ would be worth under present schedules (haulage allowance not considered):

| | |
|---|---|
| 5 lb. $U_3O_8$ at $2.00 | $10.00 |
| 1 lb. $U_3O_8$ at 0.25 | 0.25 |
| 40 lb. $V_2O_5$ at 0.31 | 12.40 |
| Development Allowance 5x0.50 | 2.50 |
| TOTAL | $25.15 |

If this ore could be up-graded by clean mining to 0.5% $U_3O_8$ and 4.0% $V_2O_5$, it would be worth:

| | |
|---|---|
| 10 lb. $U_3O_8$ at $2.00 | $20 00 |
| 6 lb. $U_3O_8$ at 0.25 | 1.50 |
| 80 lb. $V_2O_5$ at 0.31 | 24.80 |
| Development Allowance 10x0.50 | 5.00 |
| TOTAL | $51.30 |

The first figure is near what one might expect on an average in the area, and the second is pretty close to what some shippers are getting.

Estimates of mining costs run all over the lot. The range reported was from $7 to $50, plus a $1 to $2 loss on haulage. Speaking for small operators at Denver in February, 1949, Howard Balsley, of Moab, Utah, said that average mining costs were $13.60 per ton in 1944. This was based on the cost of producing 130,000 tons in the area, averaging 0.25% $U_3O_8$ and 1.8% $V_2O_5$. Mr. Balsley estimated that costs had doubled since 1944. Another party with broad, first-hand operating information estimated that costs run $19 to $20 on an average, and that with a low overhead this could be cut appreciably. Wage rates for miners are about $1.40 per hr. and $1.20 for muckers.

How much does it take to equip a mine? Estimates given for a small mine were about $4,000. Small mines generally produce less than 100 tons of shipping ore per month. Equipment includes a small compressor, jackhammer, drill steel, wheelbarrow, or possibly car and track, hoses and supplies. Larger operations involving groups of mines would run as high as $80,000 to $100,000. Such operations would need bulldozers and trucks. Some small operators are obtaining equipment on a rental-purchase option which reduces the initial outlay and diminishes risk. In addition to mining and equipment costs, we have to consider leasing costs.

## Leasing in the Area

"Prospectors have crawled over every inch of this country on their hands and knees and claimed up most of the promising ground." That's the way one operator familiar with the area summed it up. "If you want to stake any new claims," he continued, "you will have to go to the more remote parts of the area." And we wondered how much "remoter" can you get? Because of previous radium and vanadium boom periods, thousands of claims have been staked in the area. Hence leasing is common and many claims are held by owners offering them to leasers on a royalty basis. See cover.

Royalties range from 10 to 20% with no equipment furnished, and may be 50% or higher if the owner supplies equipment or supplies. In some instances royalties asked by owners are too high to attract risk capital. One successful producer said that he would not pay over 15% for unequipped and undeveloped properties. Some small producers have failed because royalties have wiped out profits. Nevertheless leases are being negotiated on a profitable basis.

Government lands withdrawn from the public domain to permit exploration by the AEC and U. S. G. S. are also available for leasers to a limited extent, and inquiries for properties in which ore has been discovered are numerous. It is obvious, of course, that the lands selected for wildcat drilling had to be withdrawn, otherwise prospectors would have slapped claims all over them and tied them up. Royalties on leases on Government land are reported to range from 10 to 20%. This defrays costs incurred in acquiring the land, but not the exploratory drilling costs. In general, private operators are eager to acquire Government leases and consider the royalties reasonable.

## Uranium Mining Can Pay

From the foregoing, we see that there is considerable overlap in the range of mining costs ($15 to $27 per ton), and the range of ore value ($15 to $30). Given average ores and favorable mining costs, a modest profit is possible, possibly of the order of $5 to $7 per ton. This margin can be widened by bearing down on production costs. Here are some possible methods:

1. **Group Operations.** Single mines cannot afford necessary bulldozers, trucks and exploratory equipment, but groups of mines can. Successful operators in the area have shown the value of group operations.

2. **Pre-concentration of Ores.** With ores consisting of barren sands cemented by soft valuable minerals, pre-concentration with portable equipment is a logical cost-cutter. Thirty years ago Standard Chemical Co. pre-concentrated ores commercially at the Joe Jr. mill near Uravan. Since then, U. S. Vanadium Corp., AEC, and Vanadium Corp. of America have worked on this problem. Vanadium Corp. of America succeeded in "scrubbing sands clean" with experimental equipment, but power costs were high and the concentrate was too fine for salt roasting. However, experienced men in the area look forward to the solution of this problem.

3. **Haulage.** Long hauls from mines on the Plateau to canyon roads could be short-circuited with aerial cable equipment. This again would only be feasible for group operations. Perhaps the "Sky-Hook," an ingenious self-powered cable car capable of handling 5 to 10 tons up 40-deg. inclines, would do the trick. See E&MJ, August, 1948.

Even with improved technology, mining on the Plateau will still involve capital risk, as all mining does. Currently these risks are being taken and profits are being made. This speaks well for the independent producers there because many of them are newcomers to the mining field, having been farmers, ranchers, fruit growers, etc. It should also be a challenge to experienced mining men to come into the area and do as well or better.

# Could the Treasury Raise

**Mr. Bratter thinks the Treasury could do just that, without an enabling act of Congress, but it isn't likely to happen for quite some time.**

HERBERT M. BRATTER
Washington, D. C.

"CAN THE TREASURY overnight increase the price of gold?" This question was put to me by the editor of *Engineering and Mining Journal*. For years, as a Government economist and private citizen, I have watched American gold legislation from the ringside, but I hasten to state at the outset that I am no lawyer.

Had the question been phrased differently, the reply might be easier. Had the editor asked: "Do you think the Administration wants to raise the price of gold or devalue the dollar any time in the visible future?" my reply would be "No."

However, the editor's question relates to power, not intent. It arises from the fact that there is on the statutes a clear power for the Secretary of the Treasury to change the price at which the Government buys and sells gold. While that power, last enacted in 1934, has never been specifically repealed, some hold that it has been in effect repealed by the subsequently enacted Bretton Woods Agreements Act of 1945. The most that the Treasury has stated about its 1934 power today is that the "discretion of the Secretary of the Treasury" to change the price of gold has been "limited" and "circumscribed." The power remains.

## Price of Gold

Under the gold standard, as understood by economists, the terms "price of gold" and "gold content of the dollar" mean the same thing. Thus, in the United States today, regardless of the fact that the dollar is not internally redeemable in gold coin, the price of gold is $35 an ounce Troy. The Troy ounce contains 480 grains. The gold content of the dollar, therefore, is 480 grains divided by 35, or 13.71+ grains of fine gold.

Since 1934 the weight or gold content of the dollar has remained unchanged. Hence, there has been no change in the official price of gold in the United States. Were the gold content of the dollar to be reduced, the price of gold would be raised automatically, *pari passu*. If, for example, the gold content of the dollar were to be reduced by 50% the price of gold at the Treasury would be doubled.

It is possible for the Treasury to increase the price of gold while leaving unchanged the legal definition of the weight of the dollar, but if that is done, the country violates one of the rules of the gold standard. It was actually done in 1933. The Administration at that time deliberately took the country off the gold standard, utilizing the Trading-with-the-Enemy Act. Congress later endorsed the steps taken when it passed the Thomas Amendment in May, 1933. Subsequently, that year the Administration raised the price of gold in the open market, despite some question in the Treasury as to the legality of what it was doing.

In Sections 8 and 9 of the Gold Reserve Act of 1934 the legality of the purchase of gold at premiums above the legal price of gold was retroactively ratified.

"The par value of the United States dollar" is another term, understanding of which is necessary in connection with the subject of this article. Parity means equality of value, expressed in terms of the monetary standard. As between two countries whose currencies are each defined as specific weights of gold, parity is the ratio of the two official prices of gold. Within a single country which defines its currency unit as a weight of gold, parity is that weight.

In the United States the dollar is at the official parity whenever it equals 1/35 of an ounce of gold. It is this which the Congress obviously had in mind in the Bretton Woods Agreements Act cited hereafter.

Under the "Thomas Amendment" of 1933 the President was authorized to reduce the weight of the gold dollar by as much as 50%. No time limit was set on that power. But the Gold Reserve Act of 1934, passed after the open market price of gold in the United States had been raised to almost $35 an ounce, put a time limit on this power of the President, which was several times extended, but finally was allowed to lapse in June, 1943. However, to the extent that the Secretary of the Treasury may have any power over the price of gold under the terms of Sections 8 and 9 of the Gold Reserve Act of 1934, the President also has power, the power to consent. And the President's power to consent is certainly, in fact, the power to initiate action as well.

## Gold Reserve Act

Sections 8 and 9 of the Gold Reserve Act of 1934 read as follows:

Sec. 8. Section 3700 of the Revised Statutes (31 U. S. C. 734) is amended to read as follows:

"SEC. 3700. With the approval of the President, the Secretary of the Treasury may purchase gold in any amounts, at home or abroad, with any direct obligations, coin, or currency of the United States, authorized by law, or with any funds in the Treasury not otherwise appropriated, at such rates and upon such terms and conditions as he may deem most advantageous to the public interest; any provision of law relating to the maintenance of parity, or limiting the purposes for which any of such obligations, coin, or currency, may be issued, or requiring any such obligations to be offered as a popular loan or on a competitive basis, or to be offered or issued at not less than par, to the contrary notwithstanding. All gold so purchased shall be included as an asset of the general fund of the Treasury." (31 U. S. C. 734)

Sec. 9. Section 3699 of the Revised Statutes (31 U. S. C. 733) is amended to read as follows:

"SEC. 3699. The Secretary of the Treasury may anticipate the payment of interest on the public debt, by a period not exceeding one year, from time to time, either with or without a rebate of interest upon the coupons, as to him may seem expedient; and he may sell gold in any amounts, at home or abroad, in such manner and at such rates and upon such terms and conditions as he may deem most advantageous to the public interest, and the proceeds of any gold so sold shall be covered into the general fund of the Treasury: *Provided, however,* That the Secretary of the Treasury may sell the gold which is required to be maintained as a reserve or as security for currency issued by the United States, only to the extent necessary to maintain such currency at a parity with the gold dollar." (31 U. S. C. 733)

The act which authorizes U. S. participation in the International Monetary Fund provides (Sec. 5) that:

"Unless Congress by law authorizes such action, neither the President nor any person or agency shall on behalf of the United States...propose or agree to any change in the par value of the United States dollar under Article IV, Section 5, or Article XX, Section 4, of the Articles of Agreement of the Fund, or approve any general change in par values under Article IV, Section 7..."

# Its Gold Price Overnight?

The Articles of Agreement of the International Monetary Fund in Article IV, Section 1, define par value as follows:

"The par value of the currency of each member shall be expressed in terms of gold as a common denominator..."

Section 2 of the same article specifies that:

"The Fund shall prescribe a margin above and below par value for transactions in gold by members, and no member shall buy gold at a price above par value plus the prescribed margin, or sell gold at a price below par value minus the prescribed margin."

## Snyder Comments

On repeated occasions, notably in press conferences, Secretary of the Treasury John W. Snyder has consistently denied any intention to propose a change in the dollar price of gold. In a statement handed to the press in written form on October 5, 1949, the Secretary went further. He not only denied the intention to propose a change. He made it clear that the power given the Secretary of the Treasury in Sections 8 and 9 of the Gold Reserve Act of 1934 "is limited by a number of factors," first of which is the obligation of the United States as a member of the Fund. After quoting Article 4, Section 2, of the Fund agreement, already cited, Mr. Snyder's October 5 handout reads:

"The Fund has prescribed a margin of ¼ of 1% above and below the par value for purchases and sales of gold. Accordingly, the United States has an obligation to the International Monetary Fund not to purchase gold at more or sell gold at less, than $35 plus or minus the prescribed margin so long as the par value of the dollar declared to the Fund remains unchanged. The par value of the dollar can be changed only pursuant to the provisions of the Articles of Agreement and the Bretton Woods Agreement Act, which requires the approval of Congress for any such change. Section 5 of that Act provides that neither the President nor any person or agency shall propose to the International Monetary Fund any change in the par value of the United States dollar or approve any general change in par values unless Congress by law authorizes such action.

"Even without the legal obligation to the International Monetary Fund there are important considerations of policy which, in effect, circumscribe the discretion of the Secretary of the Treasury to change the price of gold. The gold policy of the United States has been directed primarily to maintaining a stable relation between gold and the dollar."

Mr. Snyder went on to emphasize the importance which the United States attaches to maintenance of a stable dollar price for gold. He pointed out that the gold parity statutes of 1900 and 1933 require the Secretary of the Treasury to maintain parity of U. S. money with the gold dollar.

Note, however, that both these statutes were on the books when Roosevelt late in 1933 raised the price of gold without the dollar's having been formally devalued. Note also that Section 8 (already cited) permits the Secretary to buy gold on his own terms, "any provisions of law relating to the maintenance of parity . . . to the contrary notwithstanding."

Although this indicates that Snyder could, if he would, raise the price of gold, the likelihood of his doing so was lessened by President Truman's flat statement on Nov. 10 that as long as he was President, the price of gold was fixed.

While the present Secretary of the Treasury evidently regards the Bretton Woods Agreements Act of 1945 obligation as overriding the powers given him under Sections 8 and 9 of the Gold Reserve Act of 1934, it does not necessarily follow that a later law eliminates the provisions of an earlier law, unless those provisions are specifically repealed. On November 17, 1933, Attorney-General Homer Cummings sent President Roosevelt a written opinion that the powers of the Secretary of the Treasury enacted in 1862 and 1864 to buy and sell gold (the powers since re-enacted in Sections 8 and 9 of the Gold Reserve Act) were still alive in 1933.

## The Fund's Position

The board of executive directors of the International Monetary Fund, in which the United States has the largest voice, have it in their power to prescribe (under Artice 4, Section 2, of the Fund's articles of agreement) the margin above and below par value for transactions in gold by members. In the Fund's present rules and regulations this margin is fixed at ¼ of 1%. This margin could be increased without amendment of the articles of agreement. Only the rules would have to be changed. Were the margin to be expanded to, say, 10%, the Secretary of the Treasury could use his powers under the Gold Reserve Act of 1934 to buy gold at $38.50 an ounce.

Several members of the World Fund have subsidized their gold mining industries. While the intentions of the Bretton Woods Conference are somewhat obscure on this point, the Fund in practice tolerates gold-mining subsidies so long as they are not on a uniform-per-ounce basis.

Individual subsidies to individual gold mines get around the Fund's objections and are just as satisfactory to the miners concerned. It would be possible for the United States to subsidize its gold-mining industry without violating the Fund articles of agreement. For example, suppose that the Secretary of the Treasury with the President's approval were to buy all the gold produced in excess of the previous year's output at, say, $40 an ounce, it would be possible to maintain that:

(1) The gold content or weight of the dollar remains unchanged.

(2) The par value of the dollar remains unchanged.

(3) The Fund articles of agreement and recent policies are observed.

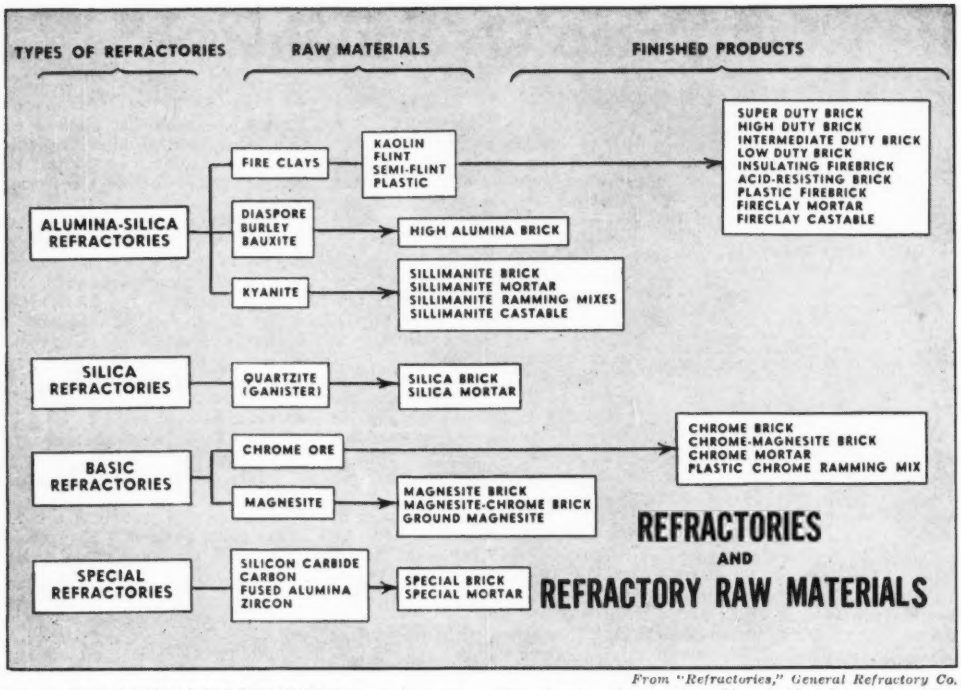
And this can be done without any new legislation by the Congress. That it would be done is, of course, most unlikely, in view of the lack of need for more gold in the monctary system and the relative smallness of the gold-mining industry in this country's economy.

## The Outlook

On the surface or behind the scenes, so far as a Washingtonian can observe, there is not the slightest sign that the present Administration desires an increase in the price of gold or devaluation of the dollar.

Whatever powers the Truman administration has over the price of gold, it has no intention of using them. Nor has it any intention of surrendering them.

Yet this generation has had experience with long-dormant laws and powers and their application to surprising ends. It has discovered that laws and promises do not always mean what they have long seemed to mean. Who can be sure, therefore, that in some future 1933, with another FDR in the White House, another Homer Cummings as Attorney-General, another Herman Oliphant as Treasury General Counsel, it will not be determined that the Secretary of the Treasury has the power to increase the price of gold?




*From "Refractories," General Refractory Co.*

FIG. 1. RAW MATERIALS FOR REFRACTORIES come from scattered sources. Important commercial refractories are fire clay, silica, chrome and magnesite. Chart incidentally reveals markets for some major non-metallic minerals.

# Refractories Cost Money Too

REFRACTORIES are a substantial expense item in every smelting operation and as such are a good target for a cost-cutting campaign. Study of cost-reducing possibilities is best done on the basis of individual operations since the large variety of types of feed, fuel, labor problems, and desired byproducts permits almost infinite variations in smelter practice. Any broad do-this and do-that program would be applicable to only a handful of cases.

Operators can best profit from a review of their refractory problems when they have a working knowledge of refractory requirements in the furnace, properties of commercially available brick and practice recommended in handling and conserving the furnace life of refractories.

Essential requirements of the refractory are that it retain heat within a given space, support physical load as part of the furnace structure, and resist destruction. There are then, certain characteristics to be weighed, along with cost, in selecting a suitable refractory.

## Important Properties

1. Softening point or pyrometric cone equivalent (PCE).
2. Thermal conductivity.
3. Resistance to fluxing.
4. Resistance to spalling.
5. Structural strength.
6. Porosity and similar physical properties.

**Softening point** can be determined for any refractory material by heating it in comparison with standard pyrometric cones which are known to melt at various temperatures. It is necessary, of course, that refractories have a fusion point above the maximum temperature experienced in the furnace. This temperature is often confused with flame or grate temperatures resulting in demand for a better refractory than is necessary.

**Thermal conductivity** should be low since refractories are commonly used to retain heat. In certain cases, however, easy heat transfer is desirable and materials of high thermal conductivity are preferred. (See Fig. 3.)

**Fluxing** results from refractory surfaces being in contact with substances which react with the refractory to form a mixture of lower melting point. The mixture formed, if it doesn't melt and drain away, may differ from the refractory in some property such as thermal expansion. A layer is formed which on heating or cooling peels off in slabs.

Fluxing agents encountered most often in non-ferrous metallurgy are iron, copper and lead oxides which come in contact with refractory surfaces as dust created

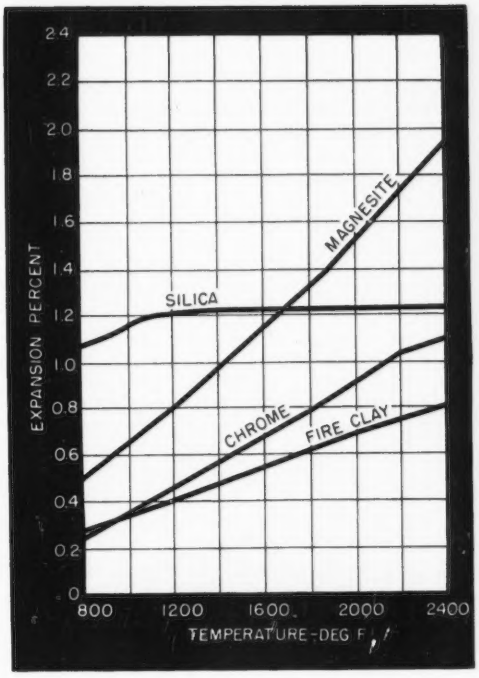
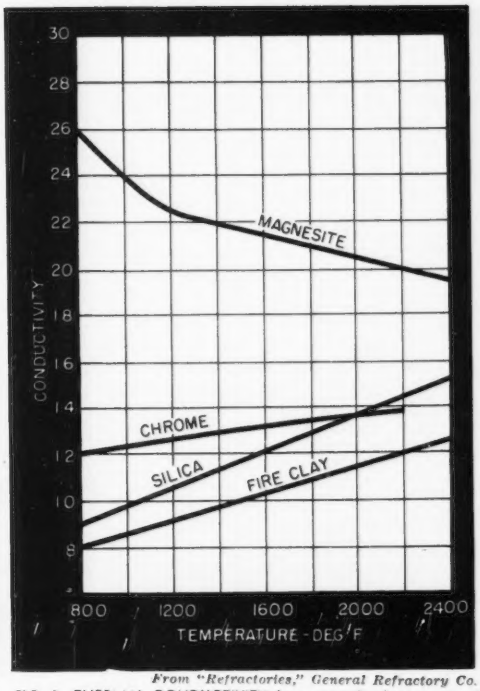



FIG. 2. THERMAL EXPANSION (linear) of refractories is an important design consideration in all types of furnaces.




*From "Refractories," General Refractory Co.*

FIG. 3. THERMAL CONDUCTIVITY (average values) is expressed in B.t.u. per sq. ft. per hour per deg. F. per in. thickness.

during charging, slags from smelting operations, or condensed vapors.

**Spalling** is the result of stresses set up which the refractory cannot absorb or resist. These stresses may be due to heating or cooling the furnace too rapidly, repeated heating and cooling cycles, or to design and construction features of the furnace such as tightness of joints and lack of sufficient expansion joints. Maximum ability to resist stresses due to thermal expansion is obtained in bricks combining a high modulus of rupture with low modulus of elasticity. A high modulus of elasticity may be the result of the manufacturing process or may be developed in service. No good way has been found to measure spalling tendency.

**Thermal expansion,** the volume changes due to heating and cooling, must be provided for in designing refractory structures. Knowledge of rates of expansion is also useful in establishing heating rates (Fig. 2) which can be followed with safety.

## TABLE I—Cost and Properties of Major Refractories

| | Approx. cost | Melting pt. Deg. F.† | Bulk density lb. per cu. ft. | Electrical Resistance‡ F. |
|---|---|---|---|---|
| Fireclay Brick* | $100 | 3245 | 120-147 | 4,160 |
| Silica Brick* | 89 | 3047 | 100-115 | 62,000 |
| Chrome Brick (per ton) | 66 | Above 3875 | 180-200 | 63 |
| Magnesite Brick (per ton) | 91 | 3920-5072 | 165-185 | 193,000 |

*Per 1000 first quality brick.
†Average or range of values.
‡Resistivity in ohms per cu. cm. at 2192 deg. F.

**Structural strength** is involved in the use of refractories as a material of construction in the furnace. Both hot and cool conditions must be considered. Heat plus load will cause failure that would not result from heat alone. Load bearing resistance of various types of refractories can be measured in the laboratory.

Other refractories properties which must be considered but which are of lesser importance are permeability, specific gravity, specific heat, hardness, electrical resistivity, and creep.

Although numerous combinations of refractory materials are manufactured, as can be seen from the accompanying diagram (Fig. 1), four products are of outstanding importance in non-ferrous metallurgy. They are fire clay, silica, magnesite and chrome.

### Principle Refractories

**Fire clay bricks** are made from naturally occurring mixtures of hydrated aluminum silicates, clays and uncombined silica. Specifications set up by ASTM show a PCE of 33-34 for the top grade or not more than 1½% deformation in the standard load test. They have a long temperature melting range. Because of this they tend to shrink at temperatures below the actual

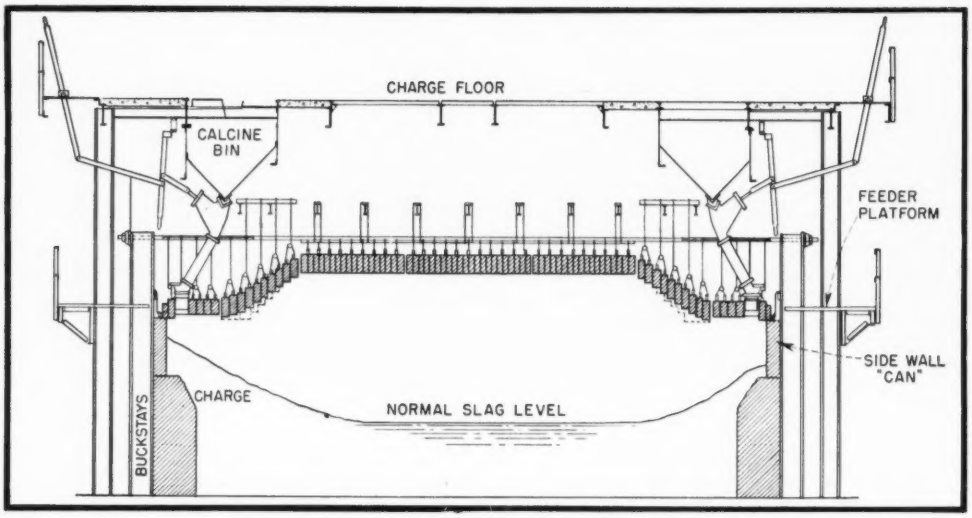



FIG. 4. SUSPENDED BASIC ROOF gives long furnace campaigns at high smelting rates. Permits changing of furnace contours without shutdown. First cost is high, but maintenance is low. Use of steel-clad brick is recent improvement.

melting point. They do resist thermal shock at lower temperature. Currently this quality brick sells for about $100 per thousand. Lower grades with a PCE of Cone 19-29 cost $66 per thousand.

High Alumina brick, made from diaspore, burley clay or bauxite, in combination with fire clay, are particularly valuable for resistance to slags of a basic nature. Several southwestern copper smelters using a high alumina brick report good results. The higher the alumina content is, the higher the fusion temperature will be.

**Silica refractories** contain over 95% $SiO_2$, being made from natural deposits of pure silica. About 2% lime is added to bond the silica grains together. Silica brick exhibit greater refractoriness than fire clays, show expansion (rather than shrinkage) at high temperatures, and have excellent resistance to deformation under load at temperatures close to their melting points. They resist attack by acid slag but are liable to severe spalling during rapid temperature fluctuations below 1,000 deg. F. They have high mechanical strength. When the brick have been well burned in manufacture, expansion is known and reversible, and can be allowed for in jointing. Current price of silica brick is $89 per thousand, top quality.

**Magnesite refractories** are made from ore, dead-burned at temperatures above 2,700 deg. F. About 50% contraction occurs and burning must be thorough so that no further contraction will take place when the brick is placed in service. To produce a brick of great density, considerable care is taken to control particle sizes and proportions. Hydraulic or toggle presses exerting from 10,000 to 15,000 psi. shaping pressure form the brick. It can be either fire-bonded or chemically bonded. Chemical bonding produces a brick with much greater resistance to spalling than fire-bonded refractories.

Magnesite, basic in reaction, exhibits more refractoriness than silica and better resistance to chemical attack by slags and metallic oxides, particularly iron oxide. However, it has a tendency to shrink and spall at high temperatures. Cost of chemically-bonded magnesite brick is much greater than that of silica, or about $91 per ton. Fire bonded brick is slightly less expensive.

**Chrome refractories** consist of ground chrome ore, screened to required size, pressed hot, and fired in a kiln of high temperatures. While chrome ore shows poor iron oxide resistance, it does not shrink like magnesite. Among its defects is the inability to carry loads at high temperatures and a strong tendency to spall if temperature fluctuates rapidly. With a wide variation in composition of chrome ores, care must be taken in choosing raw materials. Chemically bonded chrome brick sells for $66 per ton, while fire-bonded is slightly cheaper.

## Other Materials

Chrome and magnesite have been mixed successfully to form refractory products combining the best characteristics of each component. Special refractories include synthetic and natural materials having special characteristics such as excellent load-bearing properties, high thermal conductivity or resistance to attack by specific chemicals, which determines their uses. Production is generally small and prices high. Silicon carbide, fused alumina, carbon, graphite and zircon are examples of this type of refractory.

Considerable saving can be effected in choosing the right refractory for the right job. In the matter of which type of brick to use and where, most smeltermen agree on first quality fire clay or silica brick for lead, zinc and most other nonferrous installations with the exception of copper. Copper converters, in recent years, have turned to basic refractories, either magnesite or chrome-magnesite.

In each of these cases the operator's problem is to select the most economical grade refractory for his own operation, and strive to extend

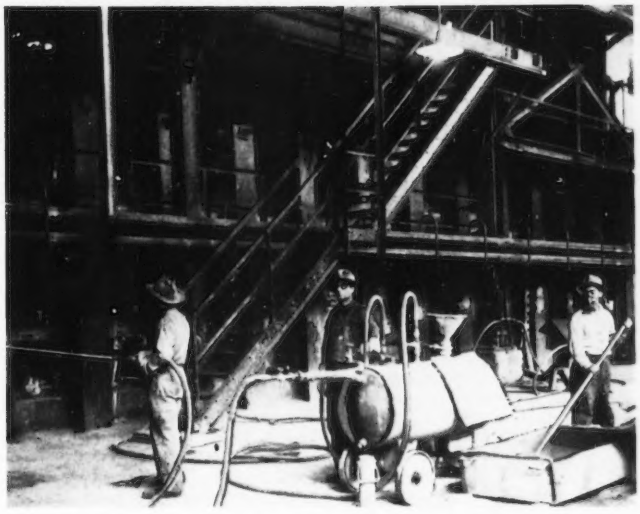


FIG. 5. HOT PATCHING with silica slurry has lengthened campaigns in sprung silica arch reverberations. Another step to extend roof life is use of secondary arches.

its service life to the utmost.

He begins with a careful design of the new installation. This is essentially a structural problem under severe conditions of expansion and contraction.

In operation, the smelterman can take other precautions which will lengthen refractory life. He can reduce thermal shock by retarding combustion while charging the furnace. Decreased velocity at the burners will save wear and tear. He can see to it that barring down of accretions is carried on with as much care as possible.

## Copper Smelting

The trend with copper converters in recent years has been toward the use of basic refractories.

The case of refractories in copper reverberatories is somewhat different. The two most vulnerable parts of the reverb are the sidewalls along the slagline, and the roof. To combat severe conditions at the slag line, magnesite brick, often backed by a water jacket, has been widely adopted.

Two vastly different approaches have been taken to the problem of increasing roof life. Canadian operators have decided that since silica could not resist fluxing at high temperatures, they would use magnesite instead.

Their efforts have culminated in the development of the suspended magnesite roof (Fig. 4). Since the basic products of the smelting process have virtually no fluxing reaction with the basic roof, very high smelting rates can be maintained at little cost in refractories.

Although magnesite is more expensive than silica, increased life of the brick has made substantial savings in outlay for brick. Downtime for repairs to wall and roof has been eliminated. Replacement of burnt out bricks is easily done, keeping maintenance costs low. One Canadian furnace has been operating since 1940 without a shutdown.

Other advantages are that a wider roof can be used than would be possible with sprung arch and the fact that the contours of the furnace can be changed without shutting down. Change in cross section can be made to permit better combustion.

Recent developments include shaped bricks to eliminate the cobbles in the curved portion of the roof, and steel-clad bricks. In the latter, steel plating is an integral part of the brick. Expansion of the steel on oxidation keeps the masonry tight. Further, the oxidized plates unite with the basic brick, forming a monolithic mass in which spalls are more firmly held in place and rate of spalling is reduced. Special clips on the steel plates facilitate changing of the brick when necessary. Operators must be careful to keep the roof top free of dust at all times. Insulating effect of dust prevents heat escape from the furnace and rapid burning out of the brick results.

On this side of the border, the silica brick is retained, and improved methods of maintenance have been adopted. A slurry, similar in composition to the roof and wall refractory, is sprayed on the sections that are becoming thin. This can be done without shutting down the furnace (Fig. 5). To further reduce fluxing action at the roof, gun-feeding of the charge has been widely adopted, which eliminates dusting of the roof. The use of secondary arches has contributed toward longer furnace campaigns.

Use of a suspended silica arch has received little consideration. It is felt that silica brick is strong enough to support a sprung arch, and that any saving from simplifying maintenance would be nullified by the high first cost of the suspended roof.

American smelting men, with excess smelter capacity at hand, have no need to crowd their furnaces. They feel, therefore, that the high cost of the suspended basic roof do not justify adoption here.

## Handling Refractories

Handling and storage of refractories is a point where carelessness can cost a lot of money. A good start toward eliminating this kind of loss would be to impress on all employees that refractories are expensive. Rules for reducing handling cost are:

Avoid unnecessary handling. Each time the bricks are handled, the corners and edges may be damaged.

Use rubber tired wheelbarrows and well sprung carts for moving brick by hand. Power lift trucks are best for handling loads on pallets.

Store refractories in a dry shed, preferably one with a concrete floor, where there is no danger that heavy floods will flood lower courses of stacked refractories.

Do not stack brick to unreasonable heights. If heavy stocks are carried, use large storage area.

Store refractory mortars and plastic in heated sections of the brick shed.

Stack brick on edge with laths in the horizontal joints.

All workers handling brick or mixing and preparing clays and mortars should wear gloves.

Give prompt medical attention to all cuts and abrasions received in handling firebrick of any kind.

# Mining's Labor Relations Give No Cause for Pride

JAMES K. RICHARDSON[1]
Salt Lake City, Utah

IT IS MY SINCERE WISH that I could have recorded here a statement of sound achievement in the labor relations field by the metal mining industry during the present year. Yet in the very topic which I have been asked to discuss with you, I find very little to commend to your attention.

Some mining managements have recognized existing wage inequities between various labor classifications. Job evaluation studies have been completed or are the subject of negotiation at present.

The Mine-Mill union, in many cases, has been stalling negotiations wherever possible knowing, from past experience, that management will keep the old contract in force until a new one is signed. Where this strategy has appeared impossible, there have resulted local strikes at essential operations.

Specifically, however, wage negotiations that have been consummated have been characterized, in the main, by a renewal of 1948-49 contracts with, in some cases, reduced workweeks. There have been instances of reduced wage scales where economic conditions have precluded a continuation of mining operations without this vital cost concession. There have also appeared, in the zinc smelting industry, fourth round wage increases which have only added to the chaotic confusion which seems to have characterized the general scene.

A look at the picture from the sidelines, which can, and probably will, be called impractical and idealistic, is most disheartening. It discloses, upon conscientious analysis, many tactical weaknesses; inexplicable positions; short range strategy, and evidence of little realistic, planned, "thinking through" of the labor problem. There are some bright spots in the picture and those individual operations stand out like "knights in white armor." Their labor relations are monuments to the integrity of purpose behind their policies and principles.

I would, indeed, be remiss in my responsibilities if I should leave you with the impression that the confusion is limited only to the managerial field. While labor's strength lies, largely, in its unity of purpose plus public recognition, in many cases, of "wrongs unrighted"; labor's weakness lies in its failure to develop honest, sincere and able leadership with an ability to correctly evaluate, for the membership, the hazards of the path they follow.

Perhaps here, too, management has been remiss in its duties and responsibilities through its failure to assist in the development of this leadership. Labor is feeling the effects of ideological undermining. One can only hope that labor's foundation is built of more impervious material than that which is seen by a quick glance at their termite ridden baseboards!

It is not my intention to go into the matter of the significance of the recently announced intention of Mine-Mill to conform to the non-Communist affidavit provisions of the Taft-Hartley Act. Suffice it to say that this issue has driven from Mine-Mill nearly 100 locals—conformance gave hope of survival. One can only speculate as to the meaning of resigning from the Communist Party and yet continuing to hold the same ideological versions of political, social and revolutionary economies.

I never have felt, and I hope I never shall feel, forced to advocate industry-wide bargaining or bargaining under governmental duress. Such actions are, in my opinion, unnecessary so long as men meet together in a spirit of mutual respect for each other and their problems. Unfortunately this ideal has seldom been attained in our industry, and in industry generally the adherence to fundamental principles has been so corroded by fear of labor or governmental retaliation that our moral fiber is slowly disintegrating. Compromise seems to be the rule of the day. The best example I know to pass on to you is the inconsistency of our various positions with respect to the requirements of the Labor-Management Relations Act of 1947.

The mining industry, like others throughout the nation, strongly advocated the passage of this measure. We have, since its passage, strongly defended it, and have urged necessary changes to balance collective bargaining powers. We consider it to be founded on fundamental principles of good Americanism and fair play.

The disheartening thing, however, is to see various mining operations, under dubious subterfuges, by-pass and nullify portions of the law. Miners work when they are "able and willing"; actual closed shops exist despite legal prohibitions; and an indulgent smile coupled with empty promises soothes the conscience of him who bargains with the Communist.

These and other examples involve a desertion of principles with which we are endowing future generations. It is questionable, in the minds of many men, whether the jeopardy in which we place these future generations is not worse than the "pillaging of our natural resources"—the "crime" of which so many "do-gooders" accuse use.

## Team Work Lacking

Team work does pay off! When we are willing to stand united, and be counted, we have achieved results in the face of formidable competition. The best example in this case is our stand on the enactment and subsequent attempts to repeal the Taft-Hartley Act. Labor's opposition, flanked by much public misinformation and propaganda, proved unable to prevail against the barrage of fact presented fearlessly in behalf of the democratic American principles involved. The significance of this action has not yet, in my opinion, been fully revealed. It will, unquestionably, become a campaign issue next year. We must then be equally militant in our defense and support of those who were instrumental in replacing

[1]This is derived from a paper presented by Mr. Richardson at the recent meeting in Spokane of the American Mining Congress, Western Division. The views expressed in this article are Mr. Richardson's own and do not necessarily express the opinions of the Utah Mining Association, of which he is manager.

the infamous Wagner Act with the axioms involved in this measure.

One can only wonder whether our by-passing of certain legal restrictions in the Taft-Hartley Act hasn't given more sanction to the President in his callous disregard of the measure's terms with his appointment of a Fact-Finding Board to consider steel's labor problem. This is an outright political invasion of government into the field of collective bargaining. While this Board was empowered only to return recommendations, anyone familiar with the pressurized tactics of bureaucracy full well appreciates that the Board and its report have been accorded much weight.

## Government Enters

As previously pointed out, there is no question that our own negotiations have been stalled in many instances by labor who has awaited this Board's findings. Historically those patterns established by "Steel" have been passed on to all industry. Labor, like management, should be fully aware of the danger it faces in urging such moves.

The dangerous thing, in my opinion, is that labor will be sold the thought that government has been the first to recognize their fundamental desire for security. Eighty percent of top corporations have pension programs. This includes many companies in our industry who have for years embraced pension and welfare plans—generous plans which have taken in all employees, not just the executive portion which creates an indefensible position. These plans will be overlooked, in the main, and if labor through this Board's action attains these legitimate gains, industry has suffered a moral loss beyond anything financial. How? Because a substantial portion of labor will be sold, and consequently sell others, presently satisfied, that only through government can independence and security be attained. If you question this, then look at Social Security. Despite industry's contributions the government is credited with the deed! During contract negotiations the arbitrator is credited with the gains despite the fact that the company did the giving. I often wonder what he did that the company couldn't have done first?

We know, in our minds, that which is just, fair and economically possible. We know that obvious wrongs must be righted by us or they will be corrected by legislative action which is detrimental to both sides. In the instances of pensions and such social benefits sought by labor it appears to be a tragic weakness on our part that we haven't considered them in the same manner that we have wages per hour. It is vital that we keep our employees constantly aware of the fact that this industry is his benefactor and friend rather than letting him feel that he is a "poor relation" of the coal miner whose "only friends are John Lewis and the government." Certainly our corporative creativeness can give us the answer to the transient and itinerant miner and the handling of funds. Why not act in this light, thus developing a reputation for fairly and honestly dealing with problems presented rather than promoting a dependence upon government "from whom all blessings flow?"

Another evidence of fumbling on both sides is the inclination of both parties to contract negotiations to place themselves in the position of delivering ultimatums. We must do everything in our power to keep the ball rolling. An ultimatum by either side is an invitation to governmental intercession!

## New Faces

Many of you have met new faces across the table during negotiations this year. The AF of L, UMW and CIO are all represented through various titles which makes one understand the confusion that arises in an ordinary citizen trying to define a metal mine. As earlier predicted, these new unions had hoped to show their new members gains to maintain their interest. They have, thus, faced a difficult decision, the consummation of a contract or stalling until its predecessor union has reached an agreement elsewhere. These new unions have, in many cases, realistically looked at the economics of their members and our industry trying to reach honest decisions without ideological bias. Their lot is made no easier when, upon the accomplishment of a contract, they find that their "ex-Communist dominated" brother has made significant gains with the widow next door.

We must take a realistic look at the legislative picture and pull together in honest efforts to ward off "low licks" headed in our direction. Take, for example, the Neely Bill to give the Bureau of Mines police powers in connection with coal mines. Can you believe that the bureaucratic appetite will be satiated by this morsel? No, gentlemen, he's got his eye on you for the next bite.

The recent action by the House Ways and Means Committee in recommending legislation to re-define the term "employee" so as to completely nullify the Gearhart Resolution spells the doom of the leaser and will close to free and ambitious miners a door which has always led to economic freedom and opportunity. It will ring down the curtain for many mines which cannot otherwise exist, destituting "little people" and their communities and creating ghost towns. Did the leaser ask for this protective custody? I have not found one iota of evidence to indicate that he asked for social security or desired it. The "pink tea intellectuals," in seeking to expand their powers, thought it best for him!

Apparently, free men may no longer freely choose their paths to economic independence. Rather they must take a path leading to complete and utter dependence upon a paternalistic bureau which can, and will, only give a pot of IOU's at the end of their idealistic rainbow.

That which faces us in our labor relations is identical to that which faces us in our national life. The celebrated and far-famed "Four Freedoms" have implanted in the minds of people negative thoughts —they are all "freedom froms." What we need today are many, many "freedom tos"—freedom to create, freedom to grow, freedom to work, freedom to provide jobs, freedom to seek independence, freedom to be individuals! The great Pacific Northwest was not won by men and women who were free *from* things; they were free *to do* things.

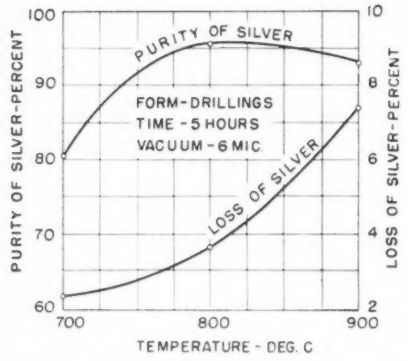
## Faith Demanded

Surely they faced hazards comparable to our own and have endowed us with intelligence, initiative and native abilities sufficient to cope understandingly with our present difficulties. We must re-win our West and our Nation, and to do this we must first win our friends, our workmen, to our side.

Solutions to the problems of the pioneer man or woman came from within themselves—therein lies the solution to our own. We must fervently re-embrace a Christian concept of fundamental moral principles which guided our fathers. Faith—faith in God, faith in our fellow man, and faith in ourselves!

**Vacuum Distillation Tests Indicate . . .**

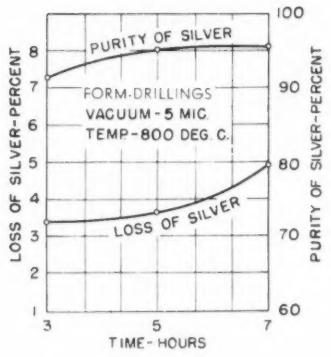
**I. Effect of Furnace Temperature**




These curves reveal that for a five-hour distilling period at 5 microns (0.005 mm.) vacuum, the maximum purity of silver residue is obtained at about 800 deg. C. with a loss of only 3.5% silver. Higher temperatures reduce silver purity as more silver is distilled over and the percentage of iron and copper in the residue becomes greater.

The crust being treated is from a western smelter. It assays 56.0% zinc, 30.3% silver, 8.1% lead, 0.9% iron, 0.15% copper; the balance is made up of arsenic, antimony and insoluble materials.

**II. Distillation Time**




Optimum time of distillation is shown to be in the neighborhood of five hours when the temperature is 800 deg. C. Additional time increases the silver loss to the condensate without improving the silver purity.

It is difficult to predict the time that would be required in a commercial size furnace. The rate of distillation would depend on the transfer of heat to the charge and upon a retort construction that would allow free flow of metal vapor into the condenser.

# . . . A Better Way to Treat Parkes

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and C. H. SHIH
Missouri School of Mines
and Metallurgy

SILVER, 95 percent pure, was recovered from Parkes Process crusts by vacuum distillation in laboratory experiments conducted at the Missouri School of Mines and Metallurgy. Moreover, recovery was made in only one step as compared with distillation plus cupellation plus recupellation involved in present commercial practice. These and other facts revealed by the experiments are attractive enough to make the vacuum method worth investigating on a commercial scale.

Experiments were carried out in a vertical porcelain tube vacuum retort furnace. The upper portion of the tube is heated by electrical resistance coils. The lower end is connected to a vacuum system consisting of an oil diffusion pump and a mechanical pump, in series. A stainless steel tube, fitted inside the porcelain tube, holds the charge up in the furnace. The distilled metals condense in the lower portion of the stainless steel tube and are easily removed from the furnace.

Separation by vacuum distillation depends upon an appreciable difference in the effective vapor pressures of the metals in the material to be treated. Vacuum treatment of Parkes Process crusts is possible from a theoretical standpoint because the vapor pressures of lead and zinc are much higher than that of silver. Successful recovery of silver in these experiments bears this out.

Early experiments were made on artificial lead, zinc, silver alloys. Results reported here in the accompanying curves, however, were obtained from the distillation of regular liquated crusts purchased from a western lead smelter. The crusts assayed 56.0% Zn, 30.3% Ag, 8.1% Pb, 0.9% Fe, and 0.15% Cu; the balance was made up of impurities such as arsenic, antimony and insoluble materials. Purity of the silver obtained depends upon the amount of copper, iron and other metals of low vapor pressure in the original crusts. Zinc and lead can be almost completely removed.

Several series of experiments were made to determine the effect of different variables. Best results were obtained when the smallest size particles available were treated for three hours at 800 deg. C. under a vacuum of five microns.

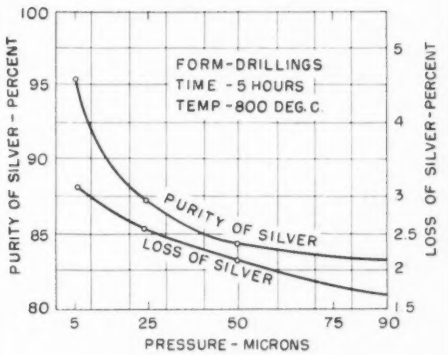
## Advantages

Vacuum distillation of Parkes Process crusts offer several advantages.

1. Zinc and lead are eliminated in one operation.

2. Relatively low temperature economizes on fuel and equipment. The 800 to 850 deg. C. temperature compares favorably with the 1,250

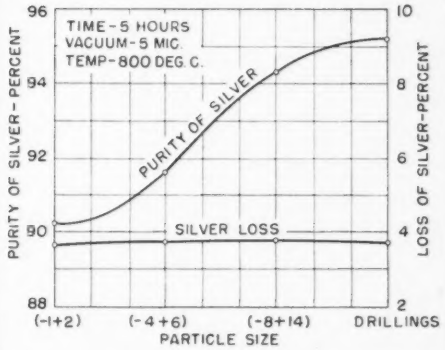
**III. Effect of Vacuum**




This series of experiments shows that a good vacuum of about five microns is needed to obtain high purity in the residue. If vacuums of 25 to 50 microns are used, it is found that too much lead remains behind, although the zinc is effectively distilled over. Fortunately, low pressure doesn't result in excessive silver losses.

A vacuum of five microns can be readily obtained in commercial furnaces with a combination of a mechanical pump and a diffusion pump. Developments in magnesium production and uranium and titanium purification have made such apparatus standard equipment.

**IV. Effect of Particle Size**




If distillation is conducted at a temperature below the melting point of the crusts, particle size will affect the distillation rate. Smaller particle size offers a greater surface for evaporation per unit weight. These curves show that lead and zinc are more effectively removed from the samples of smaller particles. Location on the curve of the sample composed of drillings can only be assumed, as it would be difficult to determine experimentally the effective particle size of such material.

Results here indicate that crusts would have to be crushed or granulated for this process.

# Process Crusts

deg. C. needed for a Faber du Faur furnace or the nearly 1,000 deg. C. needed for cupelling.

3. Zinc and lead are recovered in metallic form and can be reused.

4. Noble metal losses are reduced because no rich litharge is formed which must be reprocessed.

5. Zinc recovery is higher because no blue powder is formed and no vapor is lost.

6. If crusts can be treated as fast as they are made, there is no need of storage areas for accumulating crusts as in present practice.

7. Interest loss on values in process is low because of rapid recovery from crusts.

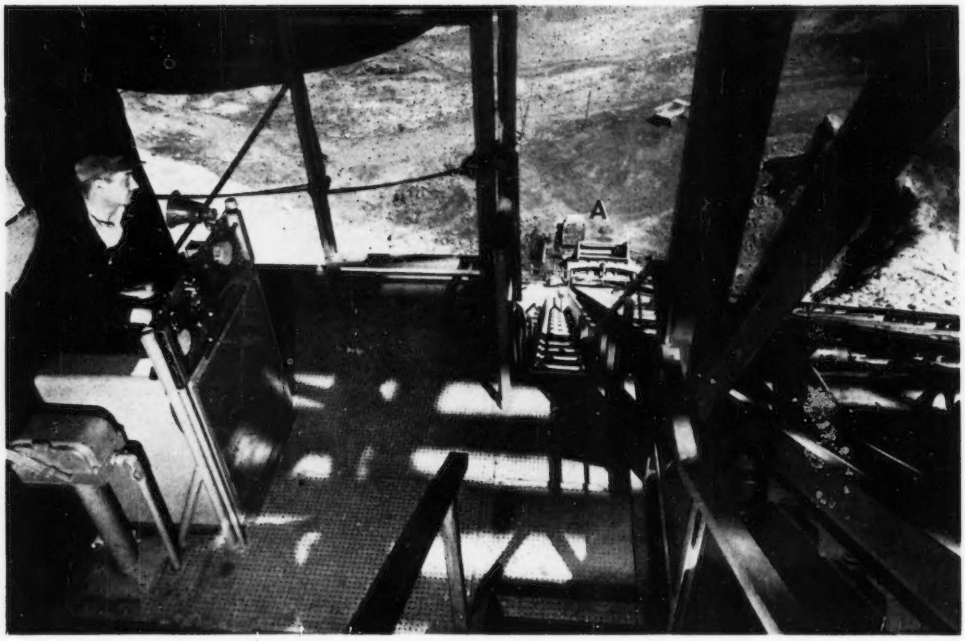
It is presumed, in the last two cases, that commercial vacuum retorts could be operated frequently enough to process crusts as they are made, thus avoiding the expense of large capacity units. This would be in contrast to the present practice of accumulating bullion until there is sufficient material for cupellation.

Various types of furnaces can be used for vacuum distillation. The most economical would probably be one or two retorts of the type used in ferrosilicon reduction of magnesium. These retorts are about 10 in. I.D. and 10 ft. long. The end protruding from the furnace is water jacketed to insure condensation of metal vapors. Heat is supplied electrically or by gas. The high alloy composition required for the temperature of magnesium reduction would not be needed for zinc and lead distillation.

Experiments have shown that if crusts are melted in contact with an iron crucible or the iron walls of the retort, liquid zinc will tend to attack the iron. Fortunately, there is no evidence of attack by zinc vapors. Corrosion by liquid zinc can be prevented by placing the crusts in a graphite or ceramic boat, or by keeping the temperature below the melting point of the crusts, at least until the zinc has evaporated.

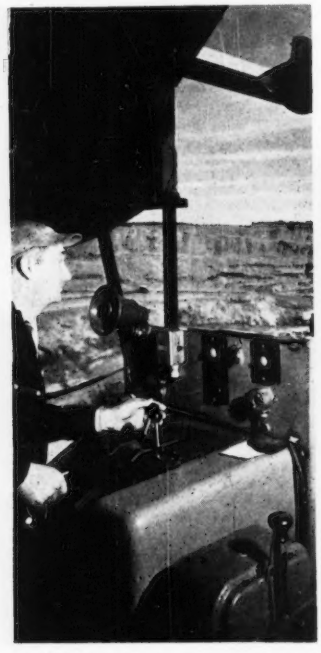
Experiments with particle sizes (see IV above) shows that distillation rate depends upon the amount of surface offered for evaporation. Use of fine particles increases the surface per unit weight of charge. If the crusts are melted, there is less surface for evaporation, which is another argument against using too high a temperature for distillation.

Arsenic and antimony in the crusts must be considered. These two metals will distill over with the zinc and lead. Probably the arsenic will be more closely associated with the zinc and the antimony with the lead, although this point has not been established. If the condensed zinc is reused for desilverization, there is the possibility that the arsenic content will build up to a point where it interferes with the operation. However, re-solution of arsenic in the lead might establish an equilibrium concentration that is not detrimental. Large scale experiments will be needed to determine the distribution of impurities in the condensate and to determine the feasibility of getting clean separation of condensed metals by using a heated condenser.

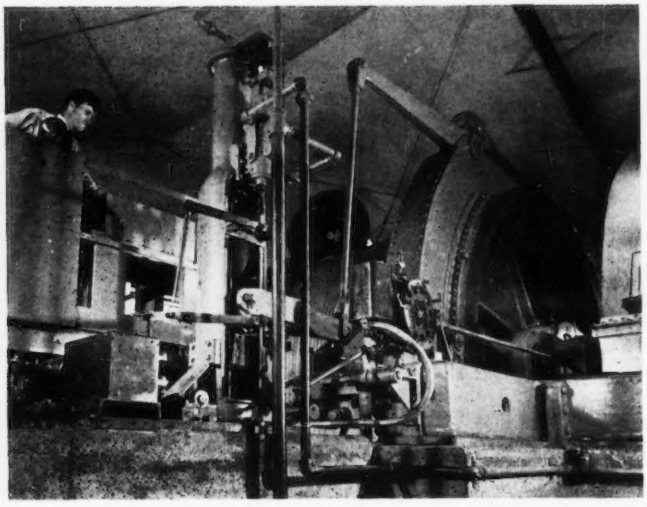



REMOTE CONTROL PANEL for hoist that raises ore out of pit is seen at left. Hoist building is 300 ft. from this screening plant. At right is the 38-deg. inclined skiproad. Below, at foot of incline, a 20-ton truck (A) is waiting to dump its load.

# South Agnew Skip



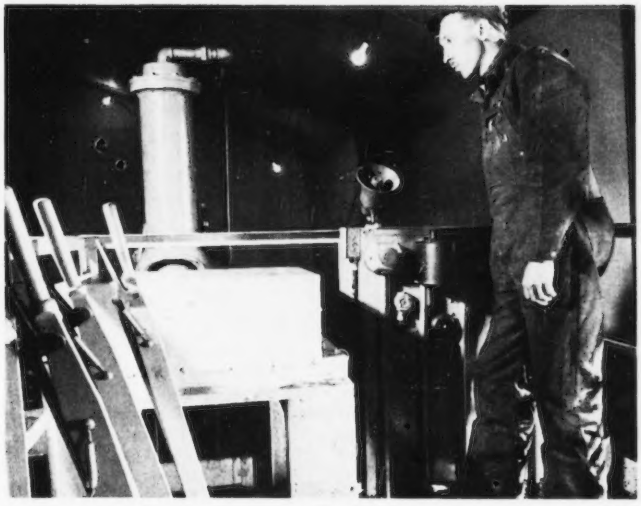
ANOTHER VIEW of remote-control panel for hoist, showing details of front.



HOIST with single 9x12-ft. drum which raises skips from pit up 38-deg. incline is controlled from point about 300 ft. away. Rope pull is 48,200 lb., rope speed 1,000 fpm.

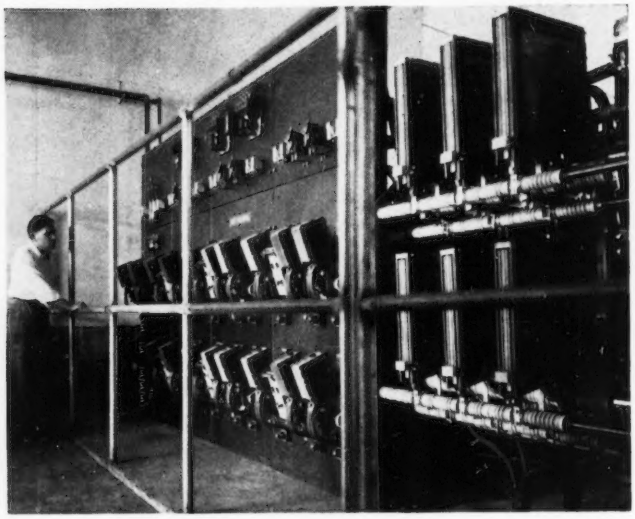
ORE IS HOISTED out of South Agnew pit on this 38-deg. incline by two balanced skips at rate of a skip per minute. Skip is designed to hold a 20-ton-truck load. Hoist is in distant building at right and is operated by remote control.

# Hoist Is Remote-Controlled



ON THE PLATFORM of the remote-controlled skip hoist. This unit can be operated manually by making certain adjustments.

WHEN SUFFICIENT OVERBURDEN had been removed from the M. A. Hanna Co.'s South Agnew orebody on the Mesabi, near Hibbing, Minn., mining was begun. The work of stripping the 150-250 ft. of spoil above the ore was described in *E&MJ* for August, 1948, by Earl S. Mollard and H. E. Reese. It involved the use of the 25-cu.yd. Bucyrus-Erie dragline, a portable plant for screening the overburden and a conveyor system over 9,800 ft. long for disposing of the spoil. Horizontally, the orebody covers only 40 acres and extends down to a point about 600 ft. below the surface. Thus the ore was confined to a deep, narrow area, presenting a problem as to the best way of delivering it to surface. Decision was finally made to install a skip-hoist system operating on a 38-deg. incline from the pit bottom to a stationary ore-screening plant on surface. The distance at present is 355 ft. Eventually it will be 830 ft. Two skips, of 50,000-lb. capacity



MAIN CONTROL PANEL for 1,300-hp., 2,300-volt, 60-cycle, 3-phase wound motor that drives South Agnew mine hoist.

SOUTH AGNEW MINE, showing skip hoist incline, A, at left, and 25-cu.yd. stripping dragline and portable screening plant, B, at right.

each, operate in balance. Each skip is designed to take a 20-ton truck load.

The prime advantage of this installation is that most of the ore can be mined without leaving benches which would tie up some ore tonnage or require a bigger stripping ratio.

## 1,300-Hp. Hoist

The hoist, a 12x9-ft. unit, is operated by a 1,300-hp. induction motor. It is equipped with a speed governor and controls against overtravel and power failure. Maximum hoisting speed is 1,000 fpm. During the past season, skips were hoisted at the rate of one a minute, equivalent to a 20-ton truck load per minute. Each skip is 8 ft. wide, 12 ft. long and 5 ft. deep, weighs 30,000 lb. empty. See photograph of skip approaching skip dump on page 83.

In construction, the skip consists of a box supported on the skip car by two trunnions at its center. A small wheel on each side of the box at its front end guides the box into the dumping position. A lock prevents the box from tipping on the incline. The loading pocket at the slope bottom is made in sections to facilitate tearing down and re-erection at lower elevations as the pit deepens.

## How the Hoist Is Controlled

The stationary screening plant is equipped with a versatile, skip-hoist, remote-control device which eliminates the need for numerous wires and long mechanical, hydraulic or pneumatic couplings.

The control stand of the new system is in a tower 125 ft. high at the top of the hoist run. From it, the operator has complete direction of the hoist, which is in a building about 300 ft. from the tower, along with the main hoist mechanism, hydraulic-brake-operating control and hoist-control panel.

The stand has two operating handles, one for raising and lowering the skip hoist, and the other for the control of the hydraulic brake engine. It also has a rotary-control switch handle that serves as a back-out master, an emergency "Stop" button that shuts down the complete system, and an "On-Off" button for the control.

With this new device, only four wires are needed for remote master-switch control between the tower and the master switch unit, instead of 15 which would be required between the master switch and the control panel, if the master switch were located on the tower.

The remote master-switch and brake-valve controls, as well as the hoist, were supplied by Allis-Chalmers Manufacturing Co. According to that company's engineers, the system will not hunt or motorize. It resynchronizes automatically following a power failure, and very little effort is needed to move either the master or brake control handles, to which the system responds instantly.

## Unit Is Fully Protected

If for any reason either the master-switch receiver or the brake-control receiver is blocked and cannot rotate, no damage will result to the remote-control system. By decoupling a small lever between the remote-control system and the brake-operating engine, it is possible to operate the hoist manually at the hoist platform by means of the master controller and the manual brake lever.

The screened ore is carried by belt conveyor to the washing plant several hundred feet away, where it is further beneficiated by vibrating screens and spiral classifiers. The product is conveyed to the railroad loading pocket or surge pile.

Hoist and screen plant were designed to handle not only ore but rock stripping as well.

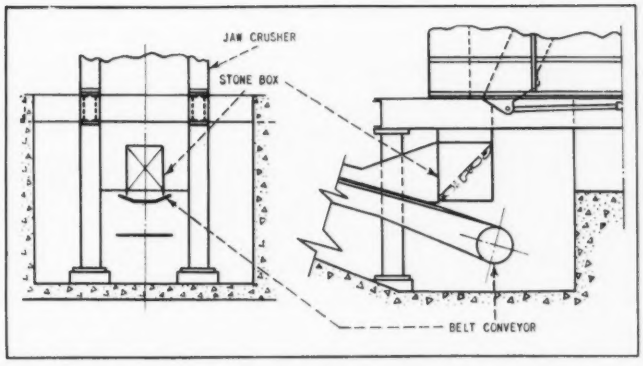



FIG. 16—STEEL GIRDERS to span opening over conveyor under crusher provide more room for servicing take-up pulley and cleaning up spills. This requires 30 to 36 in. clear space both sides of conveyor. Design is simpler than arching out concrete.

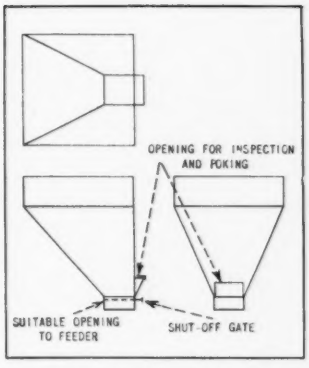



FIG. 17—VALLEYS OF BINS like this one should have minimum slope of 45 deg. for uniform flow.

# Crushing Plant Design—Part II

**The first part of Mr. Andersen's article, which discussed installation of crushers and screens, appeared in the October, 1949, issue of E&MJ on page 94. This is the second and concluding installment.**

L. M. ANDERSEN[1]
Milwaukee, Wis.

BELT CONVEYORS can be fed by an arrangement like that of Fig. 16, which illustrates a feed box ahead of the troughed belt conveyor below a jaw crusher. The distance from the centerline of the foot pulley to the centerline of the first idler is usually about 3 ft. It may be 4 ft. or even 5 ft. on wide conveyors. The belt is fed approximately 6 in. ahead of the first idler. As the material leaves the chute or box it follows the direction of the conveyor. Under ideal conditions the material as it touches the conveyor should be traveling at approximately the conveyor speed. This condition is very difficult to obtain in most cases, since the size distribution of the material varies as it leaves the crusher.

A minimum of 12 to 18 in. should be allowed between the face of the foot pulley and the floor when the takeup is in the extended position.

The number of feed points to any single conveyor should be held to a minimum.

When handling fairly dry materials it is often advantageous to bed the belt with fines before receiving the bulk of the discharge. This arrangement can easily be accomplished by placing some grizzley bars in the bottom of the spout just above the belt. It is not advisable to apply such an arrangement below a crusher, since pieces of feed may wedge in the grizzley. If the ma-

[1]Supervisor of Plant Layout, Crushing, Cement, and Mining Machinery Section, Basic Industries Division, Allis-Chalmers Mfg. Co., Milwaukee, Wis.

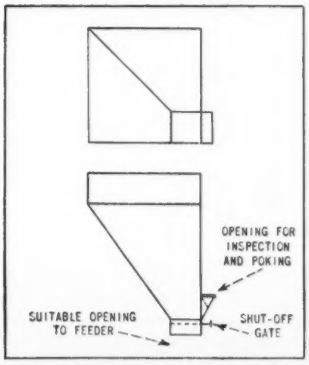



FIG. 18—BETTER BIN DESIGN for sticky ore has two straight sides and only one valley.

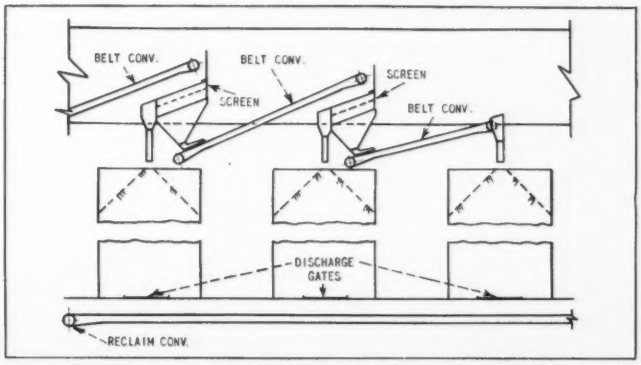



FIG. 19—THIS SYSTEM of screening and separate storage for several size fractions can be applied to open storage with retaining walls as well as to bins, thus gaining in flexibility.

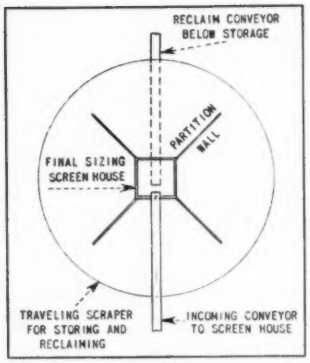

RECLAIM CONVEYOR BELOW STORAGE
PARTITION WALL
FINAL SIZING SCREEN HOUSE
TRAVELING SCRAPER FOR STORING AND RECLAIMING
INCOMING CONVEYOR TO SCREEN HOUSE

FIG. 20—RADIAL STORAGE provides a central screen house, from which sized products are moved to storage by traveling scraper.

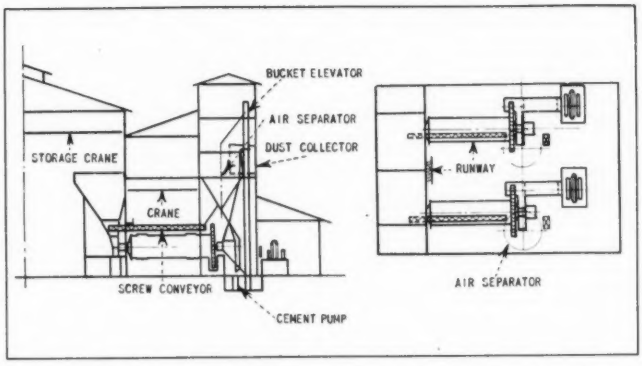



FIG. 21—AIR SEPARATOR, SET HIGH in dry grinding plant for cement or other rock, forms closed circuit with elevator, screw conveyor, and mill. It can also be open-circuited by shifting gate at mill discharge spout to divert mill product to finished material pump.

terial breaks to form a number of large slabs that wedge in the grizzley, the material could back up into the crusher and cause damage.

## Bins

When storing material approximately ½ in. and finer, such as mill feed, pulverized limestone, cement, etc., in rectangular or square bins, it is important to keep at least one side of the bin straight or vertical. This results in a more uniform flow and less stoppage of the material by arching over the discharge gate. It also aids in cleaning.

Straight side construction reduces the capacity of the bottom of the bin, but this is usually less important than to prevent arching over the discharge gate. However, it may be impossible in some installations to gain enough head room so that one side of the bin may be kept vertical. In such installations the straight side of the bin can be modified and run up at a slight slope. It is advisable to hold such slopes to a minimum of 75 deg.

In some existing installations it has been found that less arching and more uniform flow of material can be obtained by placing a straight vertical partition inside of the bin above the opening while allowing proper clearance at the opening.

It is well to let the bin flare out at the bottom to form an open pocket above the discharge gates, as illustrated in Figs. 17 and 18. This pocket allows for ready inspection and allows the operator access for any needed barring down.

In addition to the rectangular type, there are a great many applications where round bins are employed. This type may include a cone bottom with one discharge opening, or it may be fitted with a flat bottom with a number of discharge draw-off points.

The self-cleaning steel cone bottom round bin is usually used for cement storage of finely ground material. It is usually fitted with an access door and also with air piping to break arching of material in the cone. The access door facilitates construction and provides ready inspection when the bin is empty.

## Storage Systems

A wide range of storage systems is possible. Their selection is usually governed by the following factors: Size or capacity, degree of spouting, head room, topography of ground, whether open or housed segregation of materials, and final disposition of the finished material. Fig. 19 gives a general illustration of a combined conveying and screening storage system in which materials of different particle size are segregated. The system of radial storage, in which particles of different screen size are segregated, is illustrated in Fig. 20. As stored material is desired, it is drawn by the traveling scraper to a position where it can flow by gravity to a common reclaim conveyor. One reclaim conveyor is all that is normally required. With this arrangement various sizes can be mixed and blended as they are withdrawn, or each size may be removed independently.

When the conveyor storage is used, each size of material is delivered from the screens to its own conveyor. Each conveyor stores the material in piles by means of a traveling tripper, stacker, or shuttle conveyor system. Each stockpile requires its own reclaim conveyor. This conveyor is usually located beneath the storage pile in a concrete tunnel. The concrete tunnel is provided with gates for delivering material to the reclaim conveyor. It is also possible with this system to mix and blend the various sizes as they are withdrawn. This is usually done by arranging all the reclaim conveyors to discharge to one common conveyor, which is normally required with this type of system.

Cement plants or other types of plants employing rotary kilns usually use the crane storage system. Little housing is required and the storage space can be arranged conveniently for plants of different design. Special storage arrangements are often required to centralize plant operation. Other storage systems employ elevating and conveying, as well as pumping.

## Air Separators

The installation of air separators with dry grinding mills involves some special problems. Figs. 21 and 22 show arrangements of an air separator with a grinding mill. These are typical of cement plants but can be applied to any air separator installation.

The screw conveyor receiving the tailings, or oversize, from the air separator, is placed over the mill in such a position that a runway can be located over it. This runway is used for reaching the manholes of the mill. The floor plate is made removable over the screw conveyor.

A runway is provided at the same

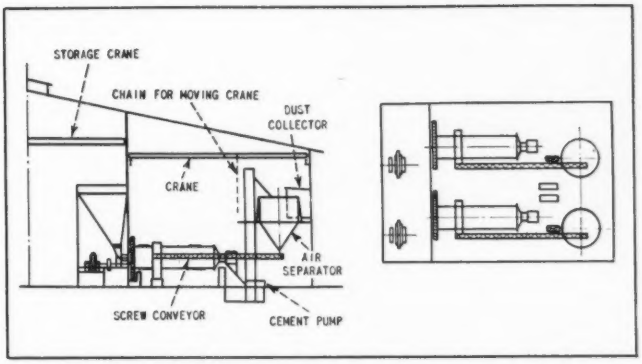



FIG. 22—AIR SEPARATOR, SET LOW in plant, gives service crane improved access to equipment, elevator is shorter, and building is lower. This layout requires shifting gear drive to feed end of mill and provision of steel-housed return scoop for separator oversize.

l.vel as the one carrying the screw conveyor. This runway serves as a platform for operating the crane. This platform may also be used when handling grinding media for the mill end for other servicing.

Fig. 22 shows basically the same layout as Fig. 21. However, the separator is set lower and consequently the elevator can be shortened.

The service crane over the mills can service the complete mill room. The supports for the separator are shorter, and consequently the building itself can be made lower.

When using the layout as outlined, it is necessary to install a return scoop on the mill, enclosed in a steel housing. This scoop can be located at the most desirable location along the mill for the return of the separator oversize. The screw conveyor bringing the oversize back can be built in with the platform alongside the mill.

When using this arrangement, it is necessary to place the gear and drive at the feed end of the mill.

## Drainage

When preliminary layouts and studies are being made at the selected plant site, careful and thoughtful consideration should be given to the level of the plant floor. The maximum depth of the necessary machinery pits must be considered, and a method of removing water from them provided. If a suitable drain from the pit would prove costly or is impractical for other reasons such as sinking the pit in solid rock, then a sump must be added to the pit with suitable pumping facilities. Plant floors should be provided with a slight slope and drainage gutters to permit hosing down the floor without leaving the areas of standing water.

## Machinery Installation

Machinery in reduction plants should be installed so as to be readily accessible for repair and inspection; as for instance, in the case of conveying machinery where a runway is required along one or both sides. Floors should be placed only in locations where service space and storage areas are required; whole building areas should not be floored over if the floor space is not required for some definite purpose. The absence of unnecessary flooring saves building expense, allows the operators greater vision for operating machinery throughout the plant, and permits easier removal and replacement of machinery parts.

Service cranes or other suitable devices should be provided over crushers. Floor sections and spouting should be made removable where they interfere with dismantling of crushers or other large machinery. Ample floor space should also be provided to accommodate machinery parts. This is important, since it often happens that a number of parts must be removed in order to gain access to the final machinery section that requires attention.

A small capacity hoist for servicing and inspection is required in some installations. An installation of this kind may require considerable head room and a large area.

For example, in a slurry storage and blending tank system in a cement plant, the agitator in each tank needs frequent attention. In normal building requirements, there need be only about 9 ft. between the top of the tank and the underside of the roof trusses.

However, a lift of about 26 ft. is needed to raise the agitator impeller clear of the tank. Therefore, a hatch should be built into the roof and the lift beam placed above the roof at the required height.

Attention has been called to the importance of ample room around machinery for servicing and operation. Along with this the safety of the operator should be considered. For example, suitable guards should be placed over drives, and railing and toe guards should be installed to conform with local law requirements.

Grading may be used for runways and inspection platforms. Concrete or steel floors should be used in sections where parts are to be stored and also where the floor will support machine parts when assembling or dismantling.

Machinery in a plant is often interlocked for starting or stopping to avoid the possibility of damage to machines. In a crushing plant it is very important to provide a surge box between the crusher and the conveyor. This stone box should be large enough to allow the crusher to run and clear itself when the feed and discharge conveyors are shut down. In some cases it is convenient to have an overflow opening at the stone box to simplify the interlocking.

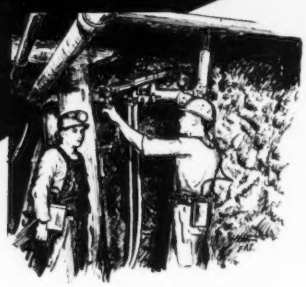
## Important Sidelights

Elevating and upward-conveying machinery must be furnished with automatic hold backs to prevent the loaded elevator or conveyor from rolling back with a load in the event of a power stoppage.

A crane may be provided with an auxiliary hoist over the primary crusher to break bridging of blocky material in the feed opening. The auxiliary hoist may consist of an air cylinder, or an all electric hoist may be used.

In designing a plant layout, careful consideration should be given to future expansion, machinery handling, spillage disposal, dust control, floor washing, drainage access to machines, head room, crane coverage, floor diversion because of unit shutdowns, practical week-end shutdowns, storage of materials in process and of products, and safety of personnel. This will result in lower operating costs and may prevent costly alterations at a later date.

# KEEPING TAB ON PRACTICE



**For Better Lighting Underground.** Underground mine lighting has improved slowly over the last 25 years. The electric cap lamp is as far ahead of the carbide lamp as the latter was ahead of the sunshine or oil lamp and the candle. The lighting of stations and main haulageways has improved to the extent that the incandescent filament lamps are better and are used more generously. Stopes are more likely to be lighted than formerly, especially at the points of activity. Extension of scraping practice, particularly, and its gradual electrification has resulted in bringing power into the stopes or to points close by. The desirability of being able to see the scraper from the hoist has been an important factor. Floodlighting of large open workings at critical points is more commonly practiced. But despite this advance, underground workings are still for the most part poorly lighted, judged by surface standards, or not lighted at all, so far as the extension of lighting circuits is involved.

Justification for this condition, if it can be justified, is to be found in the electric cap lamp. The miner takes his light with him, as of old, but it is a much better light than formerly. There is room for argument as to the extent to which a mine should be wired for lighting away from the stations and haulage roads. Questions of safety, efficiency and employee relations enter. Much is heard in places of the difficulties experienced in interesting young men in underground mining. Better lighting may be a partial solution for such problems.

Fluorescent lighting is rapidly replacing incandescent lighting on surface. The explanation here is that despite the higher first cost of the fluorescent lamp with its auxiliary starter and so-called ballast, the user saves money through greatly decreased current consumption. Under normal conditions, the fluorescent lamp, on the average, will produce twice the amount of light as an incandescent lamp for the same amount of energy consumed. Its life is also much longer, being 7,500 hours of actual burning, compared with 1,000 hr. for the standard industrial incandescent lamp. Against these advantages there are some disadvantages besides the higher first cost. The fluorescent lamp is subject to depreciation of light output at temperatures below normal, such as may be experienced in a current of air. Moisture content in the air may also have some effect. Further, the 100-watt fluorescent lamp, equivalent roughly to a 200-watt incandescent lamp, is the biggest now made.

To date, in mine lighting underground in the United States, little use has been made of fluorescent lamps. At Cleveland-Cliffs' Mather "A" mine, in Michigan, two such lamps are in use on the 5th level, to provide light for a saw filer. Here excessive moisture underground is given as the reason for the limited application. The company has developed rubber sockets that are almost moisture-proof and finds it easy to replace the Mazda lamps. In Mexico, at Cananea, fluorescent lamps are being used successfully to illuminate shaft stations. Doubtless there are other scattered installations but the present use is not great.

Abroad, British engineers are reported to be experimenting with fluorescent lamps, particularly at coal faces. Work by British Thomson-Houston, Ltd., and General Electric Ltd., is reported to show that the use of fluorescent lighting systems in collieries will be extended. Advantages indicated, besides efficiency and long life, are: the daylight coloring obtained and the low surface brightness with resultant absence of glare.

**More About Carbide-Tipped Forged Steel.** Tungstar Corporation at Bishop, Calif., A. F. Carper general superintendent, has been a user of the alloy drill steel having 4-point forged bits tipped with tungsten-carbide inserts that O. J. Black's shop in Bishop has been turning out (*E&MJ*, Aug., 1949, p. 80).

According to Mr. Carper, the rock drilled was very hard, highly abrasive, garnet-filled tactite. Conventional steel detachable bits would drill from 6 to 8 in. per sharpening and their use would require at least 150 bits per round, and one and one half to two shifts to drill a round.

The insert steel now used is ⅞-in. hollow-hex, high-alloy, chrome-nickel steel with a cross bit and four inserts, using steel in lengths of 2, 4 and 6 ft. This steel in a mounted jackhammer will drill from 150 to 200 ft. per sharpening with a gauge loss of about 0.005 in. per sharpening. The time of drilling a hole is about a third of that required for conventional detachable bits, due to so much smaller holes being drilled. It was always possible to complete a round in one shift.

As to costs, the detachable bits cost approximately 40c. each and can be sharpened twice. The complete drilling life is about 24 in. of hole per bit. With 150 bits per round and three rounds per bit the cost would be $60, or $20 per round plus the sharpening cost.

In comparison, the carbide-tipped steel requires three pieces of steel at a cost of $48 and will drill the three rounds without sharpening, at times even five rounds per sharpening. If, after drilling three rounds, the carbide bits were abandoned, the cost per round would be $16 or a saving of $4 per round, plus the labor saved and the saving in time and air. Some of these drills were used every work day for as long as nine weeks with many sharpenings. They usually had to be abandoned when two or more inserts were lost or broken.

One-inch hexagon steel was used for the stopers with equal success.

Two sets of steel are required for each machine, one for current drilling and one as a spare in case of breakage or while a set is being sharpened. The detachable bits also require the use of steel rod, shanks and special threads, plus the time of changing the bits while drilling. One of the contractors asked if he could have the insert steel; if so, he said, his bid would be lower for the contract.

Tungstar recently completed a short crosscut in granite 120 ft. long without loss of an insert or a worn-out bit. Some trouble with shanks was experienced due to faulty forging.

This experience adds up to the following, in Mr. Carper's opinion.

1. Use smaller steel and bits, as there is practically no gauge loss.
2. Smaller holes make for greater drilling speed.
3. Smaller steel costs less and is easier to handle.
4. Lighter machines can be used that cost less, take less air and are cheaper to operate, yet give fast drilling time.
5. One set of steel is in use at the machine, as with detachable bits, yet there are no bits to change, carry or lose.
6. By using high-alloy steel, the steel costs more, but thanks to its long life, the cost per foot is less.
7. The drill runners like this steel as they lose no time in changing bits.
8. Sharpening costs are very low.
9. Some of the drills last for weeks and none have completely worn the carbide insert out. Breakage of the steel or loss of inserts have usually been responsible for retiring the drill.
10. One-inch hollow-hex stoper steel is equally satisfactory, drilling just as fast, and seldom breaking or losing an insert.

# MARKETS—Trends and Prices (*Continued from page* 61)

## Copper Statistics

Following is a summary of the copper statistics reported by members of Copper Institute, figures in short tons:

**United States**

| Production: | May | June | July | Aug. | Sept. | Oct. |
|---|---|---|---|---|---|---|
| Crude, primary .... | 70,703 | 63,639 | 56,360 | 55,930 | 57,460 | 62,790 |
| Crude, secondary .. | 10,555 | 8,412 | 6,089 | 6,349 | 7,410 | 6,271 |
| Totals ..... | 81,258 | 72,051 | 62,449 | 62,279 | 64,870 | 69,061 |
| Refined ..... | 98,139 | 92,118 | 85,638 | 85,577 | 79,949 | 86,882 |
| Deliveries, refined ... | 32,566 | 45,653 | 45,316 | 90,739 | 103,115 | 108,192 |
| Stock at end, refined.. | 128,441 | 166,925 | 212,817 | 217,167 | 193,890 | 164,464 |

**Outside United States**

| Production: | May | June | July | Aug. | Sept. | Oct. |
|---|---|---|---|---|---|---|
| Crude, primary .... | 113,945 | 110,500 | 98,472 | 92,625 | 99,860 | 104,195 |
| Crude, secondary .. | 581 | 681 | 488 | 311 | 443 | 1,696 |
| Totals ..... | 114,526 | 111,181 | 98,960 | 92,936 | 100,303 | 105,891 |
| Refined ..... | 96,743 | 97,449 | 81,277 | 84,304 | 82,946 | 85,150 |
| Deliveries, refined ... | 79,644 | 86,475 | 71,333 | 76,634 | 74,615 | 75,391 |
| Stock at end, refined.. | 165,271 | 162,798 | 161,299 | 152,840 | 150,181 | 151,443 |

## Official London Prices

Though trading in Tin on the London Metal Exchange has been resumed, beginning with Nov. 15, the British Ministry of Supply continues to fix delivered prices of copper, lead, and zinc for the United Kingdom. Quotations in effect on the last day of November were as follows:

| | Per Long Ton £ | s. | d. |
|---|---|---|---|
| COPPER | | | |
| Electrolytic, high conductivity | 153 | 0 | 0 |
| Fire refined, high conductivity | 153 | 0 | 0 |
| Fire refined, high grade | 152 | 10 | 0 |
| Fire refined, min. 99.7 percent | 152 | 0 | 0 |
| Fire refined, min. 99.2 percent | 151 | 10 | 0 |
| Hot rolled black wire rods | 159 | 0 | 0 |
| LEAD: | | | |
| Soft, foreign duty paid | 97 | 0 | 0 |
| Soft, Empire | 97 | 0 | 0 |
| English, refined | 98 | 10 | 0 |
| ZINC: | | | |
| Foreign (G.o.b.) duty paid | 85 | 10 | 0 |
| Domestic (G.o.b.) | 85 | 10 | 0 |
| Prime Western and debased | 85 | 10 | 0 |
| Refined and electrolytic | 86 | 5 | 0 |
| Minimum 99.99 percent | 87 | 15 | 0 |

## Miscellaneous Metals, Ores, Minerals

Quotations cover wholesale lots, prompt shipment, f.o.b. New York unless otherwise stated

### MISCELLANEOUS METALS

(November 30, 1949)

| | |
|---|---|
| Aluminum, ingot, 99 plus percent, lb. (base price) | 17c. |
| Antimony, spot, lb., 5 tons and up but less than carload, in cases | 35.28c. |
| Bismuth, ton lots, lb. | $2.00 |
| Cadmium, commercial sticks, delivered, lb. | $2.00 |
| Calcium, lb., ton lots, 98 percent, cast | $2.05 |
| Chromium, 97 percent grade, lb., contract | $1.07 |
| Cobalt, 97 to 99 percent, per lb. | $1.80 |
| Indium, troy oz. | $2.25 |
| Nickel, cathodes, lb., f.o.b. Port Colborne (a) | 40c. |
| Magnesium, 99.8 percent, carloads, lb., producer's plant | 20½c. |
| Palladium, troy oz. | $24.00 |
| Platinum (Official quotation wholesale lots) troy oz. | $89.00 |
| Quicksilver, flask of 76 lbs., 25 flasks or more | $71.00 |
| Selenium, 99.5 percent, lb | $2.00 |
| Silicon, minimum 97 percent, spot, carloads, lb. | 16.50c. |
| Tellurium, lb. | $1.75 nom. |
| Thallium, 100 lb. or more, lb. | $15.00 |
| Titanium, 94 to 98 percent, lb. | $5.00 |

(a) Includes U. S. duty

### METALLIC ORES

| | |
|---|---|
| Beryllium Ore, imported, 8 to 12% BeO, per unit | $26.00@$30.00 |
| Chrome Ore, per long ton, f.o.b. cars Atl. ports, dry | |
| 48% $Cr_2O_3$, 2.8 to 1 ratio | $35.00 |
| 48% $Cr_2O_3$, 3 to 1 ratio | $37.50@$39.50 |
| Iron Ore, Lake Superior, Lower Lake ports, long ton: | |
| Old Range bessemer | $7.60 |
| Mesabi bessemer | $7.35 |
| Old Range non-bessemer | $7.45 |
| Mesabi, non-bessemer | $7.20 |
| Lead (Galena), 80 percent, Joplin, Mo., ton | $147.67 |
| Manganese Ore—Per long ton unit of Mn basis 48 percent manganese subject to premiums and penalties, 76@78c., c.i.f. U. S. ports, duty extra. Quoted prices largely nominal. | |
| Molybdenum Ore, 90%, per lb. of $MoS_2$ f.o.b. mines | 54c. |
| Tantalite, 60% concentrate, per lb. | $2.00@$2.75 |
| Tungsten Ore, per unit of $WO_3$ | |
| Foreign, 60 percent, duty paid (a) | $18.50@$19.50 |
| Domestic, scheelite, 60 percent and upward | $28.50 |
| Vanadium Ore, per lb. of contained $V_2O_5$ f.o.b. mines | 27½c. |
| Zinc Ore, Prime, 60 percent concentrate, Joplin, Mo., per ton | $55.00 |

(a) Nominal

### METALLIC COMPOUNDS

| | |
|---|---|
| Arsenious Oxide (arsenic trioxide) lb., in bbl. carload lots delivered | 5½c. |
| Cobalt Oxide, 72%, metallurgical grade, per lb. of Co | $1.95 |
| Copper Sulphate, 100 lb. | $7.00 |

### ALLOYS

| | |
|---|---|
| Beryllium Copper, 4 percent Be, per lb. of contained Be | $24.50 |
| Ferrochrome, 65 to 69 percent, per lb. of Cr contained | 18.60c. |
| Ferromanganese, 78 to 82 percent, gross ton, seaboard | $172.00 |
| Ferromolybdenum, 55 to 65 percent Mo, lb. of Mo, contained | $1.10 |
| Ferrosilicon, 50 percent, per lb. of contained Si | 17.3c. |
| Ferrotungsten, 75 to 80 percent, lb. of W contained | $2.25 |
| Ferrovanadium, per lb. of V delivered | $2.90 |
| Silicomanganese, 1¼ percent C, per lb. contracts | 8.6c. |
| Spiegeleisen, per long ton, 19@21% | $65.00 |

### NON-METALLIC MINERALS

| | |
|---|---|
| Asbestos, f.o.b. Canada (Quebec) mines (U. S. funds), ton: | |
| Crude No. 1 | $960@$1,050 |
| Crude No. 2 | $492@$550 |
| Spinning fibers | $232@$475 |
| Shingle fibers | $95.50@$141 |
| Paper stock | $78.50@$88 |
| Waste | $58 |
| Shorts | $27@$52 |
| Vermont, f.o.b. Hyde Park: | |
| Shingle stock | $97.00@$107.00 |
| Paper stock | $68.50@$85.00 |
| Waste | $51.00 |
| Refuse or shorts | $25.50@$46.50 |
| Barytes, f.o.b. mines: | |
| Georgia, crude, per long ton | $11.50@$12.00 |
| Missouri, 93 to 94 percent $BaSO_4$, per short ton | $9.00@$9.50 |
| Bauxite, long ton: | |
| Domestic, crude, 50 to 52 percent (not dried) | $4.00@$5.00 |
| Domestic, chemical, 55 to 58 percent | (a)$18.50@$9.50 |
| Domestic, abrasive, 80 to 84 percent | $18.00@$18.50 |
| China Clay, f.o.b. mines, ton: | |
| South Carolina and Georgia, No. 1, airfloated bulk | $8.50@$9.50 |
| North Carolina ceramic grade | $18.00@$20.00 |
| Feldspar, bulk ton: | |
| Potash or soda feldspar, 200 mesh | $18.50 |
| Glass spar, white, 20 mesh | $11.75@$12.50 |
| Fluorspar, f.o.b. mines, bulk, Kentucky and Illinois, 70% effective, $CaF_2$, ton | $37.00 |
| Acid 97% concentrate, bulk, ton | $43.50 |
| Fuller's earth, f.o.b. Georgia or Florida, ton | $7.00@$14.00 |
| Magnesite, per ton dead-burned, bulk, f.o.b. Washington | $30.50@$31.00 |
| Mica—Domestic f.o.b. mines. Punch, 12 to 22c. per lb. according to size and quality. Sheet, clear, 1¼ x 2 inch, 70 to 75c.; 2 x 2 inch, $1.10 to $1.20; 2 x 3 inch, $1.40@$1.50; 3 x 3 inch, $1.70@$1.80; 3 x 4 inch, $2.10; 3 x 5 inch, $2.40; 4 x 6 inch, $3.15; 6 x 8 inch, $4.25. Wet ground, very fine, $125@$165 per ton. Bulk sales, dry ground, $40@$80 per ton. Scrap, $26 and up. | |
| Ocher, Georgia, ton, in sacks | $24.00 |
| Pyrites, Spanish, per long ton unit of S, c.i.f. Atlantic ports | (a)12@14c. |
| Sulphur, Texas, mines, long ton | $18.00 |
| Talc, f.o.b. works, ton: | |
| New York, purified | $18.50@$20.00 |
| Vermont, extra white | $12.50 |
| Tripoli, Missouri, ton: | |
| 40 mesh, cream colored | $14.50 |

(a) Nominal

### IRON AND STEEL

| | |
|---|---|
| Pig iron, gross ton, basic, Valley furnaces | $46.00 |
| Steel, f.o.b., Pittsburgh billets, net ton | $52.00 |
| Structural shapes, 100 lb. | $3.25 |

# WASHINGTON REFLECTIONS

*McGraw-Hill Washington News Bureau*

## Federal, State Tax Reforms Seen As Possible But Mining Industry Must Unite and Fight

PAUL LEACH, JR.

Any report to the mining industry on the probability of changes in the U. S. tax structure must include a study of the obstacles standing in the way.

Before any changes in national and local tax structures, as they are applied to mining, can even be considered by the Administration, they must be cleared by the Budget Bureau, the White House, and the various Governmental agencies concerned with taxation.

Both politics (there is a major election coming up) and economics (the national debt is growing again) must be considered before any possible decrease in revenue is undertaken. Although the Bureau of Mines has openly advocated a study of taxation, and has been working at such a study, the Administration must make a policy decision before anything can come of it.

### The First Steps

The first step toward tax revision has been taken. Late in November conferences began at the Budget Bureau and the White House, over how far the Administration can go toward advocating changes in tax laws.

So far as a change of the national tax structure is concerned, then, success or failure may depend almost entirely upon a political-economic decision by the Administration within the next month or so. **If the top brass of the Administration fails to buy the idea of tax help to the mining industry, then a movement to amend the tax laws will have very rough sledding.**

### State Taxes Confused

Another problem to be faced in the over-all consideration of taxation as it affects the mining industry is the very large part the individual states play in the total tax burden on industry. In several states, for instance, the greatest part of the taxes borne by the operator goes to the state.

Here neither Congress nor the Administration can have much to say or do to change the local tax structures. It is an individual state problem. Politically, it will be harder to effect changes in state tax laws than it will be to change the national structure. The national picture is an across-the-board proposition. Conversely, each state has its own tax program, and there exists no similarity in the tax structures of the various states.

As an illustration of the wide difference between state tax levels and methods, it has been found in a recent study, using a fixed-value hypothetical mine, that while one state would charge $169,000 in taxes, another would charge the same mine $1,002,000 in taxes.

A report, still confidential, by a private tax consultant to a Government agency, showing the wide variance of tax structures in 17 mining states, concluded with the statement that, "An obligation rests on state officials responsible for the enactment and administration of tax legislation to re-examine the tax structures in their respective states."

### For Uniform Taxes

The report suggests that the various states check their levies against seven general conditions, and if the tax structure contributes to one or more, undertake some kind of revision.

Those seven check points are: 1, Discouragement of the search for new mineral deposits within the state; 2, Constraint on potential mine developers to select other states or foreign countries as theaters of operation; 3, Inefficient operation of mines resulting from deferment of mine development; 4, Waste of the state's mineral resources because operators are forced to mine only the richer ores; 5, Limitation of the nation's over-all domestic supply of needed mineral commodities; 6, Stifling, in general, of a basic industry that, as it expands, generates new business and industrial activity of every kind within the state; 7, Restriction of the state's aggregate tax revenues by limiting and narrowing the tax base, with the resulting stifling of the industry affected.

### State Tax Bases

Here are the six tax bases now being applied to mining in the 17 states studied.

**Property tax,** the basic tax, applied universally to all kinds of tangible property, is used in 16 of the 17 states studied. This is the *ad valorem* tax from which counties, municipalities, and school districts obtain their principal revenues. The measure of the tax, theoretically, is the full and true market value of real and personal property, the price a purchaser would pay to a seller. Usually, however, only a very low percentage of the true value of the property is represented in the assessed valuation made for tax purposes.

Appraisals, in about half of the states, are based on "present worth" of estimated future earnings. Alternative procedure is the use of the net proceeds of the preceding year. There are variations on this practice, too.

One strong justification for *ad valorem* taxation is the need of state governments for steady revenues, independent of economic structures, to finance such unalterable expenses as schools. The "preceding year" base can be tough in poor years, and easy in good years.

**Income tax.** Eight of the 17 states levy income taxes on all corporations, and two others base their corporation franchise tax on net income. Rates vary from 2 to 8% and are not "progressive" except where sliding scales are used for very small taxable incomes. Generally, the determination of gross income, and the deductions allowed for computation of net or taxable income, are reflections of the Federal tax system.

**Franchise tax** is based on the privilege of doing business in the state. Like income tax, it applies to corporations in general, with the taxability measured in the value of outstanding capital stock and surplus, with variations in several states. Eleven of the 17 states use this tax, most of them using a percentage rate applied to capital or income.

### The Severance Tax

**Severance tax** is applied in nine of the 17 states. This is a tax on the privilege of removing natural resource materials from the earth. This tax depends upon the application of specific rates per ton, ounce, barrel, etc., produced during the year. An alternative is a fixed percentage of the gross value of material removed during the period.

The argument against this newest of taxes is that it applies even if no profit is realized from the operations. It goes under several names; South Dakota calls it an "ore tax"; Utah calls it an "occupation tax"; and in

Montana it is a "metal mine license tax."

Opponents of the severance tax point out that it penalizes the marginal producer, that in effect it increases the minimum grade of ore that is minable. This tends to hold down exploration.

**Sales and occupation taxes.** Sales taxes, applied in New Mexico and South Dakota, are actually severance taxes applied on gross value, even though both states have severance taxes also. Idaho and Minnesota have occupation taxes, but both are misnamed severance taxes based on statutory net income.

In the various tax structures, (the composite of all taxes except Federal), it has been found that property taxes account for only about half of the taxes paid to state and local governments by mining companies. Most of the rest of the tax burden is contributed through severance or occupation taxes which, in general, are not applicable to corporations engaged in other kinds of enterprise.

Mining makes a much greater contribution to the local economy than that of other taxable industry.

In all but three of the 17 states studied the amount of the Federal income tax in a reasonably prosperous year exceeds that of the state and local taxes. Although the Federal income tax fluctuates over a much wider range than do total state taxes, the high Federal rate prevailing makes it an important factor in the finances of any corporation in years when reasonable profits are being made. The combination of the two tax structures makes it very difficult for small profits to get a start.

There is the argument that under prevailing conditions of taxation, only one reasonable course remains open to a group that has developed a deposit to the stage that warrants blocking out and the start of production. That is to sell out to one of the big integrated corporations and take advantage of the limitation on capital gains taxes.

### Convincing Government

If only to halt the trend to concentrate primary industry in the hands of a few huge organizations, the top Government brass may be receptive in the near future to a revamping of the Federal tax structure. This argument is not so moving to state Governments, which in general are not nearly so small-business conscious as is the Federal Government.

**The obvious fact is that the mining industry must come out of its shell and fight if it wants a better economic climate. It must carry the ball on tax revision both nationally and locally. This is an issue of interest to big and little corporations alike. It is vital to all those whose interest and whose livelihood is bound up with the future of mining.**

## CIO Postpones Expulsion of MMSW Union But Plans to Deal With Reds Later

JOSEPH M. GAMBATESE

Expulsion of the Mine, Mill and Smelter Workers from the CIO is only a matter of time. The CIO did not take this step against Mine-Mill and nine other left-wing CIO unions at the Cleveland convention because it did not want to bite off more than it could chew at one time.

The convention expelled the electrical and farm equipment workers, then left action against the other 10 unions to the executive board. Under new constitutional provisions, the executive board (by two-thirds vote) may expel (1) any union which consistently follows the Communist (or Fascist) party line rather than the policies of the CIO and (2) any board member who is a Communist or Fascist or acts like one. Such a person also is ineligible to serve on the board.

The electrical and farm equipment workers were expelled immediately after they boycotted the convention and announced that they would withhold payment of per capita taxes unless the CIO complied with an ultimatum intended to terminate the internal left-right split in the CIO. (The farm equipment union had merged with the electrical workers shortly before the convention in defiance of a CIO directive to merge with the CIO's United Auto Workers' union.

The precipitous action by the electrical and farm equipment workers did not conform to Communist Party strategy, which was to stick it out through the convention and let CIO take the initiative, so it could be blamed for the split.

Delegates of the 10 other left-wing unions stayed through the convention and weathered the storm of abuse that was heaped upon most of them by the right-wing convention leaders from CIO President Philip Murray and others. Some of them, like Harry Bridges of the longshoremen, defended the position of the electrical workers as well as their own.

### MMSW Stays Put

On the whole, the Mine-Mill delegation maintained discreet silence in its corner of the big convention hall. President John Clark took a place toward the rear of the delegation while Vice-President Reid Robinson and Secretary-Treasurer Maurice Travis sat at the head of the Mine-Mill table.

The eight delegates were seated after an arrangement had been reached concerning the $53,000 in per capita tax owed the CIO. According to Mine-Mill, there was a $16,000 cash payment and $37,000 note signed by the four officials of Mine-Mill.

There were rumors during the convention that the CIO intended to reorganize Mine-Mill around Clark on the theory that he was not a left-winger, but a stooge for Robinson and Travis. For awhile some credence was given to these rumors because Clark abstained from voting on some of the measures fought by the left-wingers.

Secessionists from Mine-Mill who were in the convention hall were disturbed by the rumors because their information was different. They included the leaders in the Progressive Metal Council, now affiliated with the CIO shipbuilding union, who didn't expect to remain with the shipbuilders very long. They are looking for a new home and hope to make it in a new union that may replace the Mine-Mill organization.

### Clark Challenged

The rumor was deflated when, on the last day, Clark's eligibility for membership on the CIO executive board was challenged. Basis for the challenge, apparently, was the new constitutional provision barring persons who are Communists or Fascists or pursue their policies. Right-wingers abstained from voting, and Clark was allowed to go on the Board pending further action.

This came the next day when charges were filed against Mine-Mill (and the other left-wing unions still in CIO) and a trial committee was appointed to hear the charges against Clark and the union.

### Trial Committee

The three-man trial committee is headed by Jacob S. Potofsky, president of the Amalgamated Clothing Workers, and includes Joseph Curran, president of the National Maritime Union, and Emil Mazey, secretary-treasurer of the auto workers.

Potofsky also was chairman of the other committee which investigated Communist influence in Mine-Mill almost three years ago. In its report issued in May, 1947, that committee found that Travis and other Mine-Mill officers allowed the influence of the Communist Party to interfere with the union's internal affairs.

Mazey's union in 1948 took in the castings locals which seceded from Mine-Mill and set them up in a castings division of the auto workers.

Mine-Mill will not be allowed to continue in the CIO as it has, defying the CIO and pursuing the Communist line. If its charter is not revoked and put in the hands of a right-wing group, observers predict it will be merged with the steel workers.

# NEWS OF THE INDUSTRY

ABOVE—EARLY REGISTRANTS at El Paso's International Mining Days are welcomed by Homer C. Hirsch, chairman. In the group are Joseph T. Taylor, Peru Mining Co.; Mr. Hirsch, Buck Weaver, Carlsbad drilling operator; Jack May, shaft man for AS&R; Russell R. Bryan, Real del Monte y Pachuco, oldest silver mine in Mexico. Miss Armada Perches helps with the registration.

LEFT—WALKING BOSS, W. A. Seyffert stands by portal of his tailor-made mine, built into the side of El Paso Coliseum. It was part of the "Una Noche en la Mina" program for visiting miners. Mr. Seyffert is an explosives manufacturer's representative.

## El Paso Is Host to 551 Miners from U.S. and Mexico at International Mining Days Celebration

The sixth annual International Mining Days Celebration sponsored by the El Paso Chamber of Commerce was attended by 551 mining people from the southwestern United States and northern Mexico. Three days of well-balanced informative discussions and entertainment features helped reaffirm El Paso as a hub city for southwestern mining activities and to emphasize the interest and appreciation the business people of El Paso have for the mining industry.

Mining Days opened with a banquet sponsored by the El Paso Section of AIME on Thursday evening, October 27. E. McL. Tittman, Manager of A. S. & R, El Paso Smelting Works, was master of ceremonies at the event which featured Jess H. Williams, Chickasaw, Oklahoma lawyer, philosopher and humorist, in an outstanding address. Mr. Williams discussed world policies in his expert manner, dodging platitudes and expressing realism, while loading his talk with wisecracks and homespun philosophy.

Balance of the Celebration program was carried out under the able planning direction of General Chairman Homer C. Hirsch, Secretary William J. Garard and Committee Chairmen Eugene Thomas, E. McL. Tittman, Herman Leibreich, William Knowles, R. S. Beard, A. A. Brown and A. L. Washburn and their large committees of El Paso Suppliers, business men, and Chamber of Commerce officials.

At the Welcome Luncheon on Friday, October 28, Robert D. Gray, Director of Industrial Relations and Professor of Economics and Industrial Relations of California Institute of Technology, discussed general industrial relations problems in a talk titled "Current Trends in Industrial Relations." William H. Goodrich, general manager of Kennecott Copper Corp.'s Santa Rita and Hurley operations, gave the highlights on that operation and the world copper situation. That night the convention was entertained at the El Paso Country Club by the suppliers of El Paso with a cocktail party and buffet supper.

A Rancheros breakfast started off the last day of the meeting. In the technical session of the meeting held that morning, Dr. Norris E. Bradbury, Scientific Laboratory Director of Los Alamos, discussed the international situation in relation to production and application of atomic energy. He pointed out that, unfortunately, the principal application of atomic energy is now and probably will be for some time in military uses rather than in industry and medicine. He further stressed that Russia is well along and progressing rapidly in the atomic production field; that there is yet no effective protection from the atom bomb or its resulting effects, and that international control is our only hope to give humanity protection from wartime applications. On that program was Major James F. Hamill, commanding officer of Ordnance Research and Development Division (Rockets) of Ft. Bliss, who gave the final talk of the meeting titled "Trends in Rocket Research." Major Hamill traced the development of rockets and pointed out the theoretical possibility of establishing a satellite outside the earth's atmosphere which would give that nation possessing it a tremendous military advantage.

Final event of the Celebration was a barbeque supper at the El Paso Coliseum followed by reviewing the Southwest Square Dance Festival.

The ladies attending the meeting were well entertained with such special entertainment as coffees, style shows, teas, and art exhibits.

## Bunker Hill Strike Ends

Smelter workers of the Bunker Hill and Sullivan Mining and Concentrating Co. returned to work on Monday, November 14, thereby ending a strike which started in late August. Because of the smelter strike and other mine strikes in the Coeur d'Alene district, production of lead and zinc has been curtailed sharply in the area. The Sullivan electrolytic zinc plant remained in operation but output was reduced to about 30% of capacity.

## Technical Innovations Hold Spotlight In A. I. M. E. Midyear Meeting At Columbus

New techniques, both in actual practice and in approach to industry problems, appeared in discussions during the midyear meeting of the AIME, held at Columbus, Ohio, Sept. 25 to 29. Attendance ran to over 500.

Discussion on mining industry education centered once more on the value to a recent graduate of the so-called humanistic courses now being introduced in certain mining curricula, and of further graduate work. Both programs would lengthen the training period for mining engineers beyond the traditional four years. Opinion, as in past discussions, was at a standoff, with the general feeling seeming to be that it probably would be "good for" the graduate if he can afford the time and the money.

In geological sessions, great interest was aroused in the use of trace elements for finding orebodies. Kerr and Graf told how they have tried to fit the pattern of varying content of trace elements, lead for example, in the soil over mineralized zones to the known pattern of orebodies beneath. Lead seems to be useful as a trace element; other elements are not. The Russians, of course, have made a great point of their success with this technique in locating orebodies.

Maintenance of mine openings can easily become a large item of mining cost without awakening the recognition of mine management. Several papers in the mining methods sessions dealt appropriately with this problem.

F. J. Haller told how the Mather mine found the cost of maintaining four or five miles of timbered haulage drifts rapidly becoming unsupportable. Steel sets were found to be the answer. A steel set costs about $20 against timber's $8.50 to $10.50, but the higher first cost is more than made up by savings in rock to be broken, installation time, and in length of life.

Concreting slusher drifts saves $5.57 per ft. of drift as compared with timbered drifts ($33.45 per ft.) at the Cornwall mines of Bethlehem Steel Co., as described by Joseph Bernhardt. Edward Thomas reviewed the findings of several companies that have tried channel irons as roof suspension supports in openings in flat-bedded orebodies. This practice is spreading rapidly into coal mining, although it got its start about 20 years ago in the Southeast Missouri mines of St. Joe.

The new and lusty Minerals Beneficiation Division got in another Scotch breakfast, and then had the hardihood to go on to a technical session the same morning.

Jack Myers aroused considerable discussion with his progress report on his new Tri-cone ball mill, a 9x11-ft. tapered job that replaces three smaller mills. The mill is necessarily an overflow type because a grate mill would not retain the 1-in. balls that Jack finds most efficient.

Jack's philosophy of grinding holds that the aim of the grinding circuit should not be to produce a certain size of material, but rather to do the job that will produce the lowest flotation tailing, or whatever metallurgical criterion measures plant performance. This brings chemistry and physics into play in a way that is unique as far as anyone at the meeting could judge. At any rate, Jack Myers' new mill has secured the 26% power reduction he hoped for, but in other ways a lot of work remains to be done to get the most out of the mill. His continuing study of large-diameter, slow-speed mills, using small balls, should be both useful and stimulating.

Messrs. Keyes and Dorenfeld, from Columbia, came up with an idea for applying the methods of industrial quality control to milling. It seemed apparent that the audience failed to get the point, although the paper itself is clearly written. There is available in this idea a tool that the mining industry might well make use of, but it will take more effort, and real study, on the part of mill operators in order to convince them that the technique differs in its essentials from the techniques of sampling and control that they now use.

The Aerofall mill came in for a good going over. It is notable for its use of the rock itself as the grinding medium, although tests have been run with carbide balls. This brittle material does not fracture in the mill because the speed is such that the carbide balls do not cascade, but rather roll about at the bottom of the mill.

Tuwiner and Korman presented a paper to show that in a stagnant pulp, a protective coating will form about chalcocite particles which can impede the formation of a water-repellent collector coating on the chalcocite. This interfering coating is eliminated by agitation, therefore the more agitation, the better the flotation. This may explain why it is possible to get much better results from lab. cells than from mill-size machines. It would appear from this paper that power input is proportional to the effect produced. This point is certainly worth further investigation, because if true, present designs of flotation machines are nearly all wasteful and inefficient.

Reporting on efforts to find an automatic control for regulating medium density in Heavy-Media tanks, Bean of American Cyanamid, mentioned that a Bristol instrument did the trick, but that trouble occurred with fouling up of the air tubes where the density differential is measured. It is worth mentioning again that Carl Marquardt, at Combined Metals, has the best density controlling device and that he has worked out an automatic method of eliminating this trouble with fouling of the tubes.

# MINING IN 1867

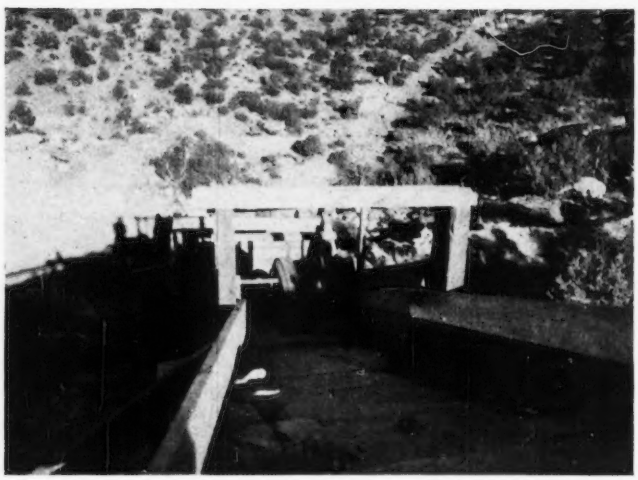
***These items made news in E&MJ for October, 1867:***

☛A National School of Mines. The first bill introduced after the beginning of the second session of the 40th Congress, was offered in the Senate by Mr. Stewart of Nevada. The bill provided for the establishment of a national school of mines, to be located somewhere on the line of the Pacific Railroad, and supported from the proceeds of the United States tax on bullion. This is a move in the right direction; but the bill is not very explicit as to the plan of the school, its objects, its organization or its government. Probably it is better to leave these details to competent professional men, than to undertake to settle them in a deliberative body like Congress. It remains true, however, that such a school will be just what its managers are able and willing to make it. Mere money will not do the work. Under capable guidance, an institution of that nature would be a lasting benefit to the country. This sort of government interference with mining enterprise is calculated to injure no one, to offend no one, and to benefit all.

☛The New International Coin. The new international coin of twenty-five francs, recently struck by the French government, is twenty-four millimetres in diameter, very slight exceeding that of the present half eagle of the United States and the sovereign of Great Britain. It bears on its obverse the conjoint inscription, "Five dollars, twenty-five francs," and is a type of the proposed monetary union of the three nations. If adopted by the governments of the United States and Great Britain, this international coin, bearing the denominations and the emblems of the respective nations, will circulate side by side in perfect equality and without impediment throughout the world.

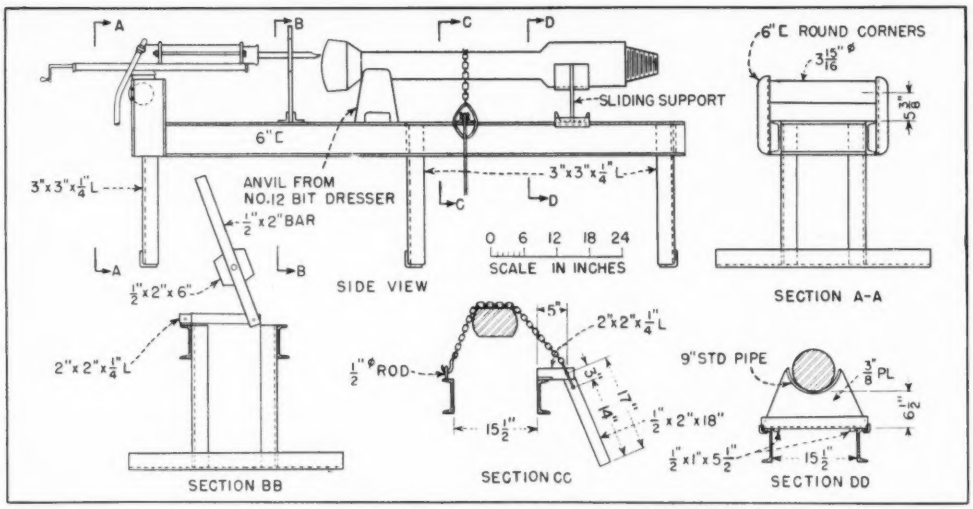
☛During the month of July the dividends of mines on the Comstock lode aggregated the handsome sum of $585,000, and during the past year $2,030,700, making a grand total of $2,615,700 that has been in a twelve-month earned by ten mines in Storey county, after paying all the expenses of mining and milling. The ore reduced probably amounted to at least $12,000,000. This immense sum of bullion is wrenched from the earth annually within a space of a mile in length by half a mile in breadth, and it affords sustenance to at least 20,000 people, and a competence to many more. The value of the Comstock lode is almost incalculable.

# OPERATING IDEAS



## Tires Retard Ore On Timbered Chute

Henry Hollings, mine foreman, of Atomic Energy Commission's uranium mine near Slick Rock, Colo., installed two rows of tires on old rails as shown to retard the fall of ore in a timbered chute which transfers ore from a mine track to a truck-loading bin below the elevation of the portal. This cheap installation saves wear on the chute. The loading bin was placed below the mine to eliminate double handling of the ore after it has been mucked into cars. Photograph at the left shows a timbered chute as it appears from the top, looking down into the ore bin at the roadside.




## Rock Drill Trims Churn-Drill Bits

C. R. Begor, Sr., mine superintendent of National Lead Co.'s Titanium Division operations at Tahawus, N. Y., developed the bit trimming machine shown here which has been used successfully to trim corners of churn-drill bits and to gouge out water courses.

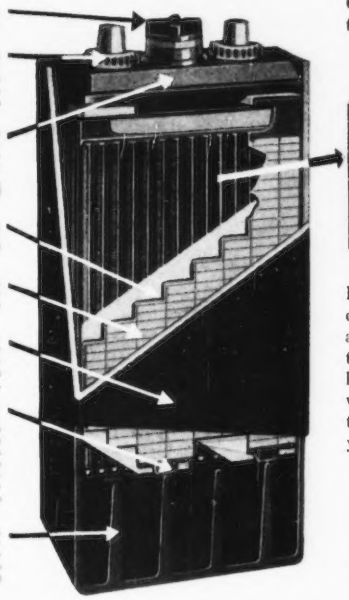
A 6-in. channel-iron frame of welded construction resting on six 3x3x¼-in. angle-iron legs supports the machine. A rock drill, with rotation pawls removed, is mounted on a shell and saddle, and an anvil from a B-E No. 12 bit dresser holds the bit, as shown above.

Cutting is done at approximately 1,800 deg. F. A flat chisel is used to trim the corners, and a gouge chisel to clean the water course. Chisels are made from a special high-temperature steel with a single beveled cutting edge at an angle of 45 deg. Mr. Begor reports that results obtained with this machine have been much better than those obtained by hand or torch cutting.

# EXIDE-IRONCLAD BATTERIES
## ARE DIFFERENT!

Specially designed to provide dependable power for
MINE LOCOMOTIVES, SHUTTLE CARS, TRAMMERS

Storage batteries are called upon to perform many tasks. No single type of battery is adequately suited to all. To meet these numerous requirements, Exide engineers have developed special types, to fit each application.* Among these several types is the specially designed Exide-Ironclad Battery. Details shown below.


**VENT PLUG** specially designed to prevent escape of electrolyte.
**GREASE SEAL RING NUT** holds battery elements securely in place . . . prevents creepage of electrolyte . . . keeps tops clean and dry.
**SEALED CELL COVER** flush with top of jar. Prevents collection of dirt or moisture . . . keeps impurities out of cell . . . eliminates leakage of electrolyte.
**SEPARATOR** of high porosity, specially treated to last the life of the battery.
**NEGATIVE PLATE** made extra heavy and built to match the long life of the positive plate.
**JAR** made of specially tough and durable Giant Compound. Built to withstand the jolts and jars of hard industrial usage.
**FEET.** Internal short circuits practically eliminated because the two feet on negative plate rest on different ribs from those of the positive plate, and because separators extend below both plates and rest on all four ribs.
**RIBS** support all plates and separators. Their height provides generous sediment space so that internal cleaning is unnecessary.

### DIFFERENT IN DESIGN
### DIFFERENT IN CONSTRUCTION
### DIFFERENT IN SERVICE QUALITIES

Chief among these differences is the unique positive plate, an exclusive Exide feature.

**EXIDE-IRONCLAD POSITIVE PLATE**
Consists of a series of finely-slotted tubes which contain the active material. So small are these slots that, while permitting easy access of electrolyte, they retard the active material from readily washing out or jarring loose . . . adding considerably to life of plate.

Exide-Ironclad Batteries have ALL FOUR of the characteristics that a storage battery must have to assure maximum performance from mine locomotives, trammers and shuttle cars—high power ability, high electrical efficiency, ruggedness and a long life with minimum maintenance. The combination of these four Exide-Ironclad characteristics assures years of dependable day-in, day-out service.

## SAFE DEPENDABLE POWER

"Exide" and "Exide-Ironclad"
*Reg. Trade-marks U. S. Pat. Off.*

*

**DESIGNED FOR STATIONARY USE**

The Exide-Manchex Battery has the manchester type positive plate with the lead button construction. Specially designed for stationary use in many classes of industry.

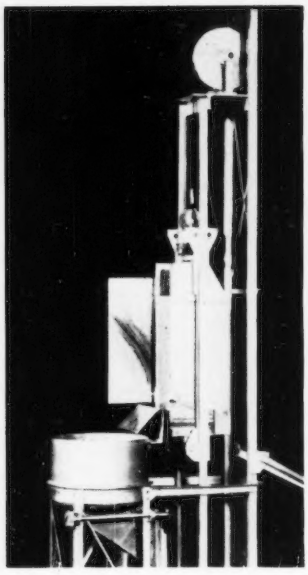
**DESIGNED FOR AUTOMOBILE USE**

The Exide Automobile Battery has plates of staggered grid construction. Specially designed for use in automobiles, trucks, buses, aircraft and numerous other applications.

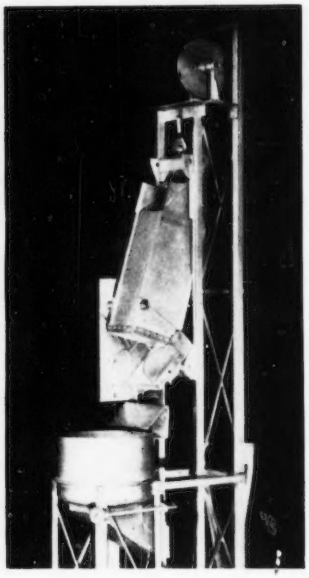
***1888...DEPENDABLE BATTERIES FOR 61 YEARS...1949***

THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia 32 • *Exide Batteries of Canada, Limited, Toronto*

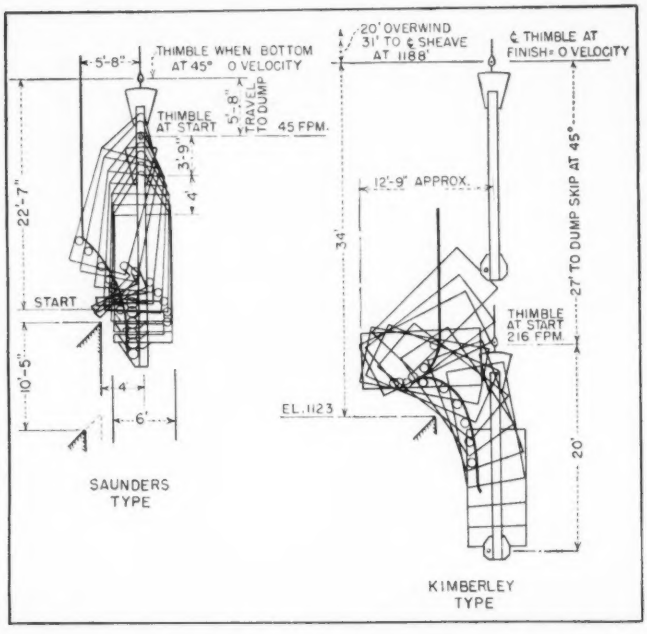
# New Bottom-Opening Skip for Mine Shafts



MODEL OF SKIP ready to dump. Side dumping wheel engages dump track on side plates.



AS SKIP IS RAISED, lower end moves out and bottom opens to discharge load.




SAUNDERS TYPE SKIP only travels 5 ft. 8 in. to dump, whereas conventional or Kimberley type of same capacity requires a 27-ft. travel to dump. Saving in headroom permits use of shorter headframe or larger ore bin at surface.

A new bottom-opening skip, designed by G. L. Saunders, 73 King St. West, Toronto, Canada, offers many advantages over other types, including the conventional or Kimberley type, which requires dumping cams to overturn the skip in the headframe.

The bail drawhead or safety mechanism of the Saunders type is almost identical to the Kimberley type. However, the skip bucket has no bottom. Two sides nearest the bail are extended up above the nominal top of the bucket (forming shields to guide the rock as it is loaded) to bearings on a suspension shaft, allowing the bucket to swing in the bail. The dump wheels are near the bottom of the bucket instead of near the top. Two rollers which support the bottom are mounted on a shaft at the bottom of the bail and offset from the center line. The bottom is one rigid, self-contained unit which is hinged, and hangs from the two sides at the back a short distance up from the bucket. On the under side of the bottom are two cam tracks which run on the two rollers. From the suspension point of the bucket, the radius of the cam tracks is struck. The radius is approximately 12 in. long, after which it is sloped back as much as possible.

As the skip is hoisted to dump, the dump wheels enter the outward curving dump tracks, swinging the lower end of the bucket out of the shaft. The bottom unit moves with it (still in closed position) running on the rollers until the radius section of the cam track is passed, where it allows the bottom to drop rapidly for practically little further upward and outward movement of the bucket.

The bucket has to move out of the shaft a very short distance to place the bottom on a 45-deg. slope, in which position it remains for overwind travel. The bottom is closed automatically by the lowering of the skip through the dump track.

## Advantages

The following advantages are claimed for the Saunders skip as compared with the Kimberley type:

1. For the same type of headframe; the bucket can be longer; the overwind travel can be longer, and bins can be taller for more surface storage.

2. A smaller headframe can be used if none of the foregoing ad-

In plants handling corrosive liquids, or fluids that must be kept free from contamination or discoloration, Stainless Steel Valves must be not only the right *type*, but fabricated of the *proper* alloy for the service.

To keep production at peak, and down-time for repairs and replacements to a minimum, alert management chooses Jenkins Stainless Steel Valves. Built to the same quality standard which has made "Jenkins" the preferred industrial valve, Jenkins Stainless Steel Valves are available in a range of sizes to meet almost any service requirement.

Equally important, however, is Jenkins Engineering Service. Providing information you need to select the alloy or type of valve which will render the best service (based on analysis of specific information about the valve installation), Jenkins engineers can be of valuable assistance.

Send the coupon today for the new folder describing the complete line of Jenkins Stainless Steel Valves. It includes specifications and helpful data on selection.

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LOOK FOR THE DIAMOND MARK
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vantages in construction are required.

3. Complete dumping cycle takes place in last 5 to 6 ft. of the hoisting cycle.

4. The center of gravity of the load is displaced only 2 ft. 6 in. horizontally.

5. No appreciable velocity is imparted to the load because of small travel and slow speed.

6. Delay at the dumping position of the hoisting cycle is eliminated.

7. The bottom, in its closed position, moves a minimum of 12 in. out of the compartment before it starts to open, and remains at least this distance over the spill chutes in the headframe at all positions in the dumping cycle. The bottom, with its side shields, prevents spill down the shaft.

8. The bottom is self-cleaned, as all of the load travels over it each time the skip is dumped.

SET OF HAND TOOLS suspended from swinging boom saves time and effort for repairman in mine car shop.

AIR-OPERATED GRINDER cleans jaw plates of crusher.

THIN AUGER mounted in chuck of multi-vane compressed-air drill cleans out holes in hollow drill steel.

## Handy Pneumatic Tools for the Mine Shop

Compressed air lines are generally installed in surface plant buildings of most mines. Hence it follows that this power should be used to best advantage for surface operations as well as underground. A few useful hand tools for mine shops are shown above. Note, for instance, at left how an assortment of drills, impact wrenches and rivet cutters are conveniently suspended within easy reach in the mine car repair shop of one mining operation. The outside end of the boom is supported by a curved monorail. This construction eliminates the usual diagonal brace required in conventional designs.

Other air tools shown are the multi-vane drill used to clear holes of hollow drill steel (right top), and the hand-held grinder used to clean jaw plates of a crusher (bottom right). Photographs, courtesy of Ingersoll-Rand Co., Phillipsburg, N. J.

(*Continued on page* 139)

# CHUTE COSTS CUT 66%
## AT STUART M. PERRY COMPANY
## WITH J&L JALLOY HEAT-TREATED STEEL PLATES

**J&L STEEL**

*In Perry's primary crusher J&L heat-treated JALLOY plates lasted ten times longer than mild steel under a daily pounding by 700 to 800 tons of blue limestone.*

*Shaker tailing chutes receive severe sliding abrasion. 3/16" J&L plates lasted 22 weeks in this application—7 times service life of mild steel.*

**Lower Maintenance . . . Longer Service Life Result in the exclusive use of J&L JALLOY on all chutes at stone crushing plant.**

The Stuart M. Perry Company, quarrymen, of Winchester, Va., has turned to J&L JALLOY heat-treated steel to provide more efficient chute liners. Perry found that JALLOY plates last four to twenty times longer than mild steel.

The result—"JALLOY steel has cut my chute costs by two thirds." That's what Thurman Perry, supervisor of the Stuart M. Perry Company, had to say about the JALLOY steel he ordered from William G. Wetherall, Inc., Baltimore, Md.

But more specifically here's how J&L JALLOY reduced Perry's maintenance costs:

**• Used as a grisley plate in the primary crusher—JALLOY lasted 5 months—10 times longer than mild steel—Saved 44 man hours per JALLOY installation.**

**• As the bottom chute in a 3 ft. Symons Cone Crusher—JALLOY was still in operation after 16½ months—four times the life of mild steel.**

**• As the head chute from the bucket elevator—JALLOY lasted 16 months—20 times the life of mild steel—Saved 80 man hours labor.**

**• As a shaker tailing chute—JALLOY lasted 5 months—7 times longer than mild steel—Saved 72 man hours labor.**

J&L heat-treated JALLOY, a fine grained, manganese-moly steel, has a yield strength of 160,000 lbs. per sq. inch and a Brinell hardness of 341 to 388. It is available in the form of bars and in plates up to 72" wide and 20' long, with thicknesses from 3/16" to 1 1/2".

Although twice the price of mild steel, JALLOY'S long life saves money in applications where impact and abrasion are severe such as: conveyors, crushers, scrapers, bulldozers, power shovel buckets, dump cars, and heavy-duty truck bodies.

Write for the booklet "JALLOY—J&L Alloy Steel." It contains information on properties, heat-treating, and the workability of this *modern* steel. The coupon is for your convenience.

Jones & Laughlin Steel Corporation
412 Jones & Laughlin Building
Pittsburgh 19, Pa.

Please send me your data booklet:
"JALLOY—J&L Alloy Steel."

NAME _____

COMPANY _____

ADDRESS _____

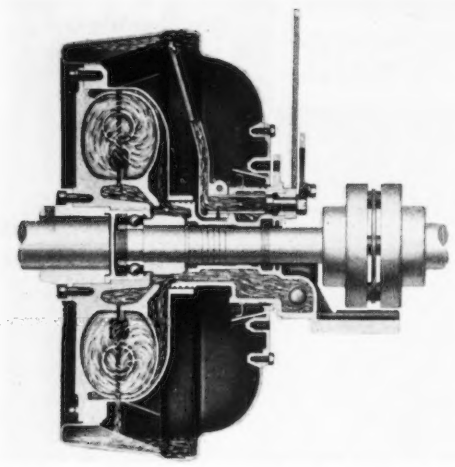
Do you recommend J&L JALLOY Steel for: _____

## JONES & LAUGHLIN STEEL CORPORATION

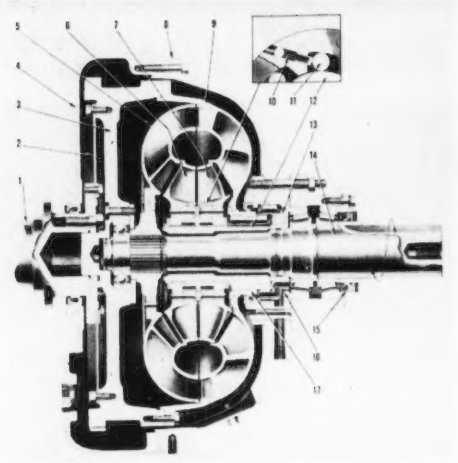
*From its own raw materials, J&L manufactures a full line of carbon steel products, as well as certain products in* OTISCOLOY *and* JALLOY *(hi-tensile steels).*

**PRINCIPAL PRODUCTS:** HOT ROLLED AND COLD FINISHED BARS AND SHAPES • STRUCTURAL SHAPES • HOT AND COLD ROLLED STRIP AND SHEETS • TUBULAR, WIRE AND TIN MILL PRODUCTS • "PRECISIONBILT" WIRE ROPE • COAL CHEMICALS

# EQUIPMENT NEWS



HYDRAULIC COUPLING has an impeller attached to the driving shaft (left) and runner fixed to the driven shaft (right). Power is transmitted through vortex of oil seen between impeller and runner. Speed is controlled by the amount of oil flowing through the scoop tube. This hydraulic coupling is manufactured by the American Blower Co., Detroit.




TORQUE CONVERTER consists essentially of turbine (5), stators (6, 7) and impeller (9). Other parts shown are driving shaft (1), flexplate (2), flywheel assembly and housing (3,4) converter housing (8), roller and spring (10, 11), ground sleeve (12), oil supply inlet (13), driven shaft (14), outer lip type seal (15). Converter is made by General Motors Corp., Detroit.

## Hydraulic Couplings and Torque Converters Transmit Power, Multiply Torque

With the roles of the hydraulic coupling and torque converter becoming increasingly prominent the field of power, mining men, as important users of heavy equipment, are giving more attention to the principle of operations and advantages of these devices.

The hydraulic coupling simply transmits power. Its essential parts are an impeller fixed to the driving shaft and an opposing runner or turbine, fixed to the driven shaft. These vaned units are mounted in an oilfilled housing which revolves with them.

Oil under the influence of centrifugal force, is discharged from the impeller against the runner, causing the runner to rotate. Speed of the runner when the system is filled with oil, is from 1 to 3% less than that of the impeller. This "slip" sets up a vortex, pumping the oil around as shown in the diagram. This maintains the torque. Speed can be varied by varying the amount of oil in the system.

Although some "slip" occurs which means a slight power loss, the "slip" is necessary for the operation.

Fluid couplings are efficient in transmitting power. They have the added advantage that sudden increases in load are taken up by the "slip" so that no shock is transmitted through the coupling to the motor.

### Torque Converter

The function of the torque converter is to multiply the torque of the driving shaft just as mechanical transmissions do by means of gear arrangements. It differs from the coupling in construction in that it has an additional set of stationary blades.

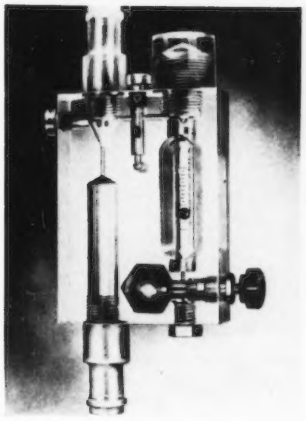
Multiplication of torque results from the moving oil hitting the reaction blades. This produces a torque on the stationary blades, and consequently on the housing, which acts in the same direction as the engine torque. The engine torque plus the reaction torque are supplementary.

Oil strikes the blades of the turbine and then continues to strike the reaction blades. These blades direct the expended oil back into the operating stream to repeat the cycle.

As torque is multiplied in this manner, turbine speed and consequently the unit it drives is reduced. As the speed of the turbine increases in relation to input speed, torque magnification decreases. The angle at which the oil from the impeller strikes the blades becomes smaller and smaller as speed goes up. The smaller the angle of impact, the lower is its thrust ability and it does less work in assisting the main oil stream.

In effect, the hydraulic torque converter offers an infinite number of speeds in transmitting power to the driven shaft, as compared with mechanical transmissions which are limited to a certain number of definite gear ratios. Furthermore, nearly all hydraulic drives are completely automatic in operation.

Additional advantages are the facts that they make no noise in operation and there are no rigid mechanical connections throughout the system. They function smoothly as compared with the jerking action of friction clutch and gear type transmission drives. Vibrations are not transmitted to the prime mover and maintenance requirements are low.



## Chemical Feeder May Aid Flotation

Compact, self contained chemical feeder (the "Feed-Rator") simultaneously controls, meters and dispenses reagents and other chemicals into a larger stream. Built-in eductor takes the place of a pump and many highly corrosive chemicals can therefore be fed directly from a container.

Made of transparent acrylic plastic, measuring 10 x 5 x 2 in. overall, the unit is easily installed and maintained. It will treat up to 7,000 gal. per day of water directly. In a bypass arrangement, using a solution containing 5% active reagent by weight, five parts per million of the reagent can be delivered to over 14 million gal. of water per day.

This device could be readily applied in the mill for feeding reagents to flotation machines.

Available: Fischer & Porter Co., Hatboro, Pa.

FILTER MASK protects worker from nontoxic dusts. "Flex-a-Foam" mask weighs one oz., is simply constructed, comfortable to wear. Available: Goggle Parts Co., 1468 W. Ninth St., Cleveland, Ohio.

HYDRAULIC CRANE SCALE is accurate to one percent of reading. Adjustable dial eliminates tare. Capacities are 10,000, 20,000 and 30,000 lb. Price, $882 to $1,385. Available (60 days): A. H. Emery Co., Stamford, Conn.

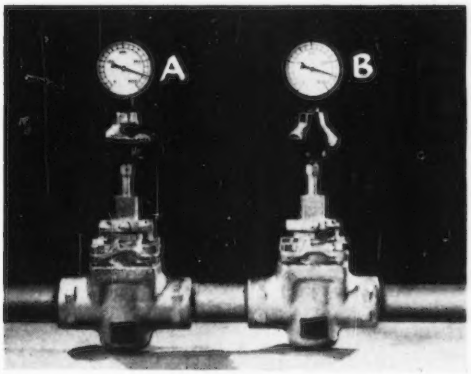
## Single Pass Bit Has Unique Features

The new single pass "Spiralock" bit offers substantial savings where bit reconditioning is impractical or undesirable. It is designed for fast drilling at lost cost.

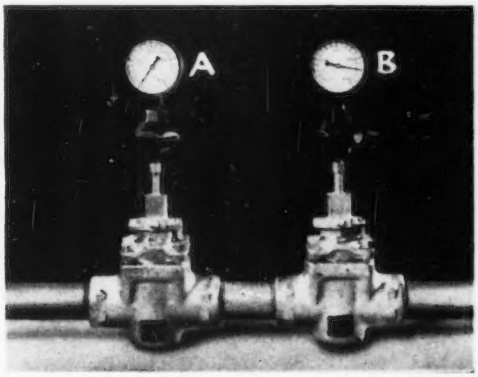
Important features stressed by the manufacturer are:

1. It is easy to put on and remove from the drill steel.
2. The bit has a square socket that spirals slightly as it recedes, forming the "Spiralock" union that prevents the bit from coming off in the hole.
3. The back face of the bit is scalloped and rounded off to prevent chips from packing behind the bit.
4. The "X" cutting edge prevents rifling in any ground.
5. Any drill steels can be used. Steels of any size and section on hand can easily and quickly be adapted for this bit.
6. Crowned chisel pilot makes for easier starting and centering.

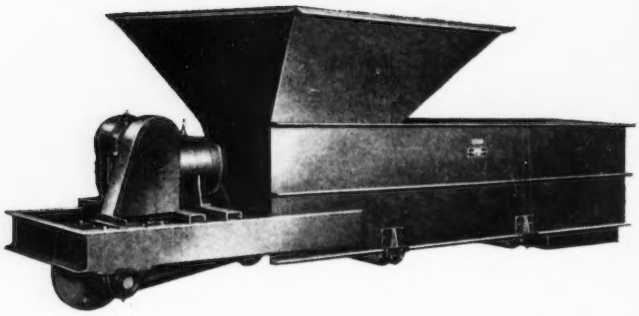
Available: Timken Roller Bearing Co., Canton, Ohio.



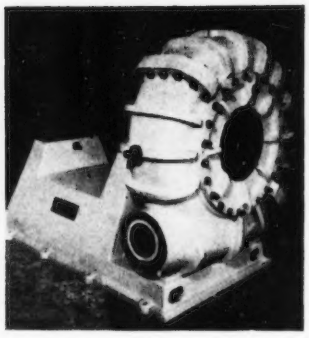

ENERGIZED LUBRICANT eliminates necessity for frequent lubrication of plug valves. Compressed "Hypermatic" expands to fill voids, assuring 100% lubricaton over long periods. In test above, valves are filled with non-energized lubricant (A) and "Hypermatic" (B).



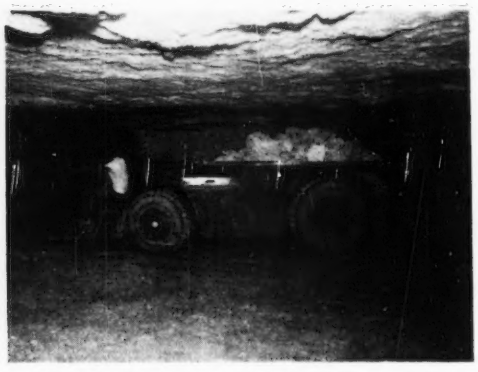

Six months later (right), pressure in A is zero; decline in B is little. "Hypermatic" can be obtained in stick or bulk form for Nordstrom valves. Available: Rockwell Mfg. Co., 400 N. Lexington Ave., Pittsburgh, Pa.



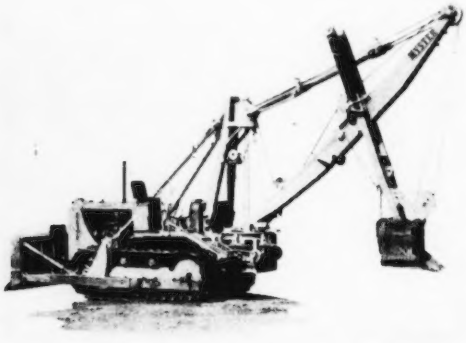
**RECIPROCATING PLATE FEEDERS** will handle up to 225 tons per hour of crushed stone or heavy ores. Reciprocating plate forms bottom of hopper, moves on two rollers. Feed rate can be controlled by changing throw of eccentric, altering speed, or regulating the sliding door in the forward wall of the hopper. Write Bonded Scale & Machine Co., Columbus 7, Ohio, for bulletins No. 902 and No. 929.



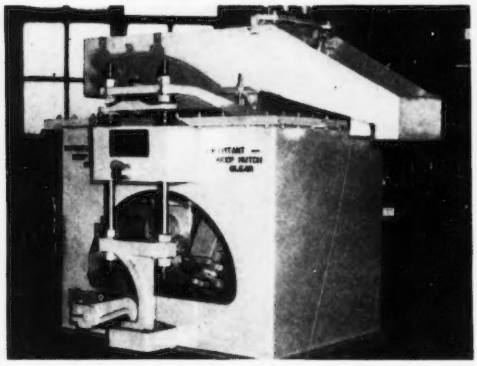
**DREDGE PUMPS** are made of Thomas Ni-Hard for highly abrasive service. Use clear water for sealing between impellers and lining. Available: Thomas Foundries, Inc., Birmingham 1, Ala.



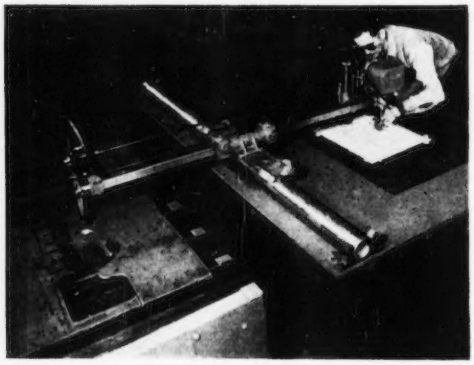
**SHUTTLE CAR** (60-E-11) is powered by single diesel generator set. Carries fuel for full shift at rated power. Load limit is 14 tons, length 24 ft., width 7 ft. 10 in. Available: Joy Mfg. Co., Oliver Bldg., Pittsburgh 22, Pa.



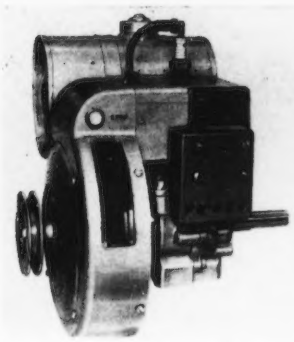
**SHOVEL FRONT** can be mounted on Caterpillar D7 and D8 tractors. Has ½-cu. yd. capacity. Seven "Hystaway" variations include pile driver, crane, hoe front. Available: Hyster Co., 2902 N.E. Clackamas St., Portland, Ore.



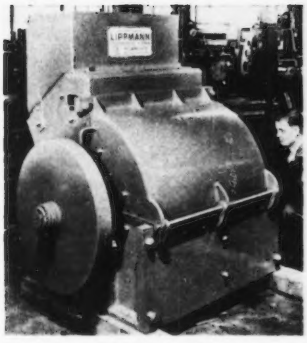
**NEW JIG** features easy adjustment of stroke characteristic, bed depth and discharge. "Jimmy Jig" is offered in 18 x 24-in. and 24 x 36-in. sizes. Available: James Equipment Co., 35 E. Runyon St., Newark 5, N. J.



**SHAPE-CUTTING MACHINE** will cut steel up to 8 in. thick in any shape within 54 x 32-in. area. Portable "Monograph" weighs 145 lb. with guide rail. Price, $695. Available: Air Reduction Sales Co., 60 East 42nd St., New York, N. Y.



GASOLINE ENGINE develops 4 hp., weighs only 19 lb. Features are compactness and light weight. Dimensions are 9½ x 11½ x 13 in. Available: Homelite Corp., Port Chester, N. Y.




PULVERIZER features steep angle feed chute, manganese steel armored wearing surfaces, spider type congestion relieving rotor. Made by Lippman Engineering Works, 4603 W. Mitchell St., Milwaukee, Wis.

## Rotary-Type Drill

Joy Mfg. Co.'s new 58-BH rotary-type blasthole drill, a picture of which was shown in last month's Equipment News, was, through an unfortunate error, accompanied by descriptive data pertaining to an older model. The new machine is self-propelled on crawler treads and is designed for operation by diesel or gasoline engine or by electric motor. It is stabilized at the drilling location by three-point suspension hydraulic jack system. It is a strong, rugged machine having ample weight to actuate roller-cone-type rotary drill bits properly and effectively through the hardest of dolomitic limestone.

Early performance with this new blasthole machine indicates drilling progress at the rate of 15 ft. or more per hour in hard, dense dolomite and 30 ft. per hour while drilling through ordinary cement limestone. Normal diameter of the hole drilled by the 58-BH is 6¼ in. to any depth required in rock quarry work.

## BULLETINS

**Pumps.** Bulletin No. 49-6600 on vertical pumps where net positive suction head is limited is available from Byron Jackson Co.—Pump Div., Terminal Annex, Box 2017, Los Angeles 54, Cal.

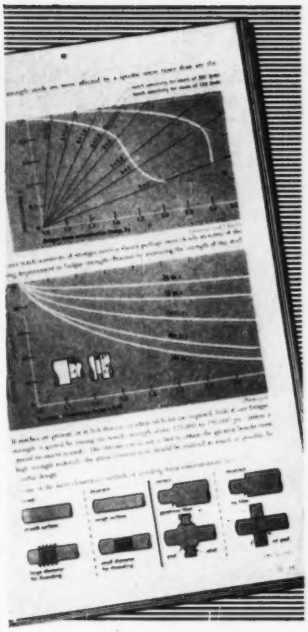
**Packing.** Greene, Tweed & Co., North Wales, Pa., offers two bulletins on their new developments in packing. Write for bulletins TBPR-619 and TB-918.

**Magnetic Equipment.** A new 8-page illustrated booklet, "Dings Certified Magnetic Equipment," has been released by the Dings Magnetic Separator Co., 4740 W. Electric Ave., Milwaukee 14, Wis. Gives specifications, applications and special features.

**Rust Preventives.** "A New All-Star Line-Up of Rust Preventives" describes and lists uses of Rust Veto products. Has chart of physical properties of all products. Write E. F. Houghton & Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.

**Combustibles Recorder.** Design improvements and new applications for Bailey Combustibles Recorder are featured in illustrated bulletin, 150-A, distributed by Bailey Meter Co., Cleveland 10, Ohio.

TELESCOPING SCAFFOLD reaches up 62 ft., folds to 12 ft. 8 in. over truck cab. Unit is powered by 92-hp. diesel. Available: Mixermobile Mfgrs., 6855 N.E. Halsey St., Portland, Ore.

**Every designer must be something of a metallurgist**

Here are 72 pages packed with information of vital significance to engineers faced with the design, selection and treatment of steel components to give a specified service at minimum cost.

Besides dealing with scientific design, the book gives important metallurgical data, all compiled from the designer's viewpoint. Free on request.

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IN EFFECT, many storage battery locomotives and shuttle cars run on "free power." This applies whenever a company can reduce its line power costs by reducing its peak-load demands, and is able to get all battery charging done during low-load intervals.

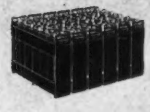
EDISON Nickel-Iron-Alkaline Storage Batteries are ideally suited to such service. Six or seven hours of charging during the off-peak period is normally all they need, because they can be charged at an average of full normal rate without injury. They require no critical adjustment of charge rates and can often be charged directly from d-c lines.

Their cells are built of rugged steel to withstand rough haulage duty, and contain an electrolyte which actually preserves the steel parts. Their electrochemical principle of operation is free from self-destructive reactions.

EDISON Batteries last and last, and so through the years cost less and less. If you do not already use them, get a current price quotation . . . you will probably find prices *much lower than you think;* annual operating cost *less than you pay now.*

**ADVANTAGES OF EDISON NICKEL-IRON-ALKALINE BATTERIES: They're mechanically durable; electrically foolproof; quickly and easily charged; simple to maintain; not injured by standing idle.**

**EDISON**
*Nickel • Iron • Alkaline*
**STORAGE BATTERIES**



**EDISON STORAGE BATTERY DIVISION**
**of Thomas A. Edison, Incorporated, West Orange, N. J.**
**In Canada: International Equipment Co., Ltd., Montreal and Toronto**

PIPE MARKER is self-sticking. Each "Quik-Label" comes on its own card. Background color depends on pipe service. Available: Dept. 75, W. H. Brady Co., 815 N. Third St., Milwaukee, Wis.

## Equipment Shorts

**Launder Spray.** A 40 to 60 percent water reduction is claimed for launder spray in flotation plant operation. Nozzle or jet is made of resilient rubber. Dirt, sand and other foreign materials are automatically ejected by flexing of the nozzle. Available: **Booth Engineers,** 146 South West Temple St., Salt Lake City, Utah.

•

**Inhalator.** Just open cylinder valve, attach mask to patient's face. Oxygen automatically flows at rate required by patient. To aid breathing if necessary, increase oxygen pressure with manual control button. Prices: $88.50 $147.50 and $205.00. Available: Medical Div., **Scott Aviation Corp.,** 538 Erie St., Lancaster, New York.

•

SLIDE-CHART gives useful data for oxy-acetylene cutting of various thicknesses of steel with two different standard tips. Available FREE: Air Reduction, 60 East 42nd St., New York 17, N. Y.

•

**Diesel Engine.** The four-cylinder HR-400 has been added to the line of **Cummins** Diesels.

•

**Contactor.** High-voltage air break contactor is only 15 in. wide, 25 in. deep and 38 in. high. Has mechanical and electrical interlocks for reversing or dynamic breaking service. Write **Allis-Chalmers Mfg. Co.,** Milwaukee, Wis.

•

**Pump Shaft Seal.** Standard, abrasive resistant and special shaft seals

BATTERY CELL-FILLER flashes warning light when water reaches correct level. Has finger control of flow. Available: Electric Storage Battery Co., 19th St. & Allegheny Ave., Philadelphia, Pa.

replace stuffing boxes for preventing leaks around a rotating shaft. Feature easy removal and maintenance. Available: Peerless Pump Div., **Food Machinery and Chemical Corp.**, 301 West Ave., Los Angeles 31, Calif.

•

**Motor Couplings.** Fractional horsepower couplings are adjustable for change in speed and power demand. Permits you to select motor for running rather than starting load. Available. **Centric Clutch Co.**, 22-26 South Ave., West Cranford, N. J.

•

ALL-METAL SLIDE RULE applies "back-to-back" principle to Log Log scale. It is easy to learn and operate. Available: Pickett & Eckel, Inc., 1111 S. Fremont Ave., Alhambra, Calif.

•

**Air Compressor.** New IKA-500 portable air compressor is diesel driven. Supplies full 500 cfm. at 100 psi. Regulator slows compressor to slowest practical working speed. Available: **Ingersoll-Rand Co.**, 11 Broadway, New York 4, N. Y.

•

**Thawing Compound.** Chemical powder, "Melt," is said to have 12 times the thawing capacity of salt. Leaves no residue. Available: **Chem Industrial Co.**, 1114 Hipodrome Bldg., Cleveland 14, Ohio.

•

## Correction

The Geiger counter referred to in October EQUIPMENT SHORTS as "made by Nucleonic Corp. of Allis-Chalmers Mfg. Co., Milwaukee," should have read, **"Made by Nucleonic Corp. of America, 497 Union St., Brooklyn 31, N. Y.**

# A MERRY CHRISTMAS
from
# OLD SAINT "VIC"!

**On his 25th Christmas "Vic" brings you Hearty Greetings!**

And don't let his whiskers fool you! His Victaulic Joints are flexible and quick. His Full-Flow Elbows swivel as easily as ever. His iron veins are tight and lasting. He is more ready than ever to serve you from his work-shop with dependable piping necessities — Victaulic Pipe Couplings . . . Victaulic Full-Flow Elbows, Tees and other Fittings . . . and Vic-Groover Pipe Tools—all engineered for modern, simplified piping.

**Merry Xmas and a Prosperous New Year!**

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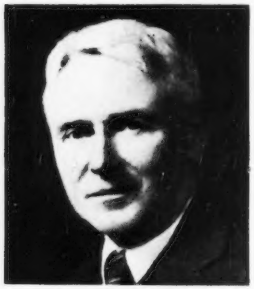
# PERSONAL NEWS

**E. S. McGlone,** vice president in charge of western operations of the Anaconda Copper Mining Co.; **Francis A. Thomson,** president of the Montana School of Mines and chairman of the executive committee of the Mining Association of Montana, and **Carl J. Trauerman,** secretary of the Mining Association of Montana, were elected members of the Board of Governors of the American Mining Congress for the ensuing year.

**R. A. Perry,** manager of the Murray, Utah, smelter recently shutdown by American Smelting & Refining Co., has been appointed inventory auditor for the firm's western department.



DONALD H. McLAUGHLIN, president of the Homestake Mining Co., was elected president of the American Institute of Mining and Metallurgical Engineers for 1950 on Nov. 16. A former professor of mining and engineering and mining geology at Harvard University, he served as dean at the College of Mining, University of California, and as vice president and director of Cerro de Pasco Copper Corp., before becoming president of the Homestake company in 1945.

**Devereux C. Josephs,** president of the New York Life Insurance Co., was recently elected to the board of directors of American Smelting & Refining Co. He succeeds the late **Charles D. Hilles.**

**J. Wilfred Patterson,** of Aspen, Colo., and Salt Lake City, representing American capital, flew to Noumea, New Caledonia, during the late summer. He is examining a number of chrome, copper, blende-galena and cobalt properties, on which the Pacific Engineering, Mining & Trading Co. had compiled all the private and official geological records that were obtainable.

**Charles Will Wright** sailed Oct. 13 for Europe to visit Athens, Rome, Paris, Madrid, Lisbon and London. In addition to getting information on certain mine development projects, he will make a study of the present mining legislation, exchange controls, labor conditions, taxes and tariffs, and the changes that are being considered to encourage better cooperation between local and foreign mining interests for increased output of strategic minerals under private enterprise. His address is care of the American Embassies in the above mentioned cities.

**Frank M. Estes,** mining engineer, has returned to the United States after many years in Colombia, South America. At present he is living at 208 East Cherry Circle, Memphis, Tenn.

**Victor G. Ford,** formerly with Cia. Minera & Agric. Oploca de Bolivia, Chocaya, Bolivia, joined the Sinai Mining Co., Ltd., ABU Zenima, % Port Said & Suez Coal Co., Port Tewfik, Egypt, in October.

**Vaughn D. Hildebrandt** and **Rudolph G. Wuerker** have been appointed assistant professors in the department of mining and metallurgical engineering at the University of Illinois. **Robert W. Bohl** has been promoted to the same rank. Mr. Hildebrandt received his bachelor of science and master of science degrees from Michigan State College. Mr. Wuerker spent three years in Korea as a mining and consulting engineer, and held a similar post in the Philippines. He served as lecturer in mining at the Philippine Islands University and on the engineering materials staff of the University of California.

**William R. Wright** is operating in the Province of Viraguas on lead, zinc and gold alluvial deposits. These deposits have been studied by **W. F. Dietrich,** professor at Stanford University, who is now with the U. S. Bureau of Mines in Juneau, Alaska.

**Reginald Rowand** has been appointed manager of the barytes plant and properties for the Baroid Sales Division of National Lead Co., at Magnet Cove, Ark. He joined Baroid in 1945 as superintendent of construction and maintenance. In 1946 he was made superintendent of the company's bentonite plants and properties with headquarters at Belle Fourche, S. D. **Harold E. Billings,** formerly with the titanium division, and cost analyst of the production department since 1947, has been made supervisor of product control for Baroid's production department. **B. C. Elsley** has been appointed assistant superintendent of the bentonite plants and properties. Prior to joining Baroid, he was geologist for Benguet Consolidated and Balatoc Mining Co. in the Philippines, and later geologist with Consolidated Mining & Smelting Co. in Canada. **Byron H. McCain,** former supervisor of excavation, has been made superintendent of Baroid's bentonite mines and mills.

**R. G. Smith,** Folsom, Calif., has been named president and general manager of the Natomas Co. He has been with the company for 37 years, and since 1933 has been dredging superintendent in charge of operations. Mr. Smith succeeds the late **Thomas McCormack** as president and **Douglas McCormack** fills his father's place on the board of directors.

ROGER O. OSCARSON, secretary, Northwest Mining Association, Spokane, Wash., was vice chairman, arrangements committee for the 1949 Metal Mining Convention of the American Mining Congress, held in Spokane in September. He was appointed from the Northwest to the AMC board of directors.

**P. V. Burgett,** chief engineer of Oliver Iron Mining Co.'s eastern district, Virginia, Minn., has been appointed to the State Board of Registration of architects, engineers and surveyors.

**John Lamprecht,** mining engineer, has joined the engineering staff of Oliver Iron Mining Co. at Virginia. **B. C. Erickson** has taken a similar position with the company at Hibbing.

**Kenneth C. Brownell,** president of American Smelting & Refining Co., **Oscar S. Straus,** treasurer, recently completed a three weeks' inspection tour of the Mexican properties of the company. **R. P. Reese, Jr.,** assistant to the president, has also completed a trip to Mexico and the southwestern smelters.

**J. T. Roy,** superintendent of the East Helena plant of American Smelting & Refining Co., has completed a three weeks' trip to the company's El Paso lead smelter.

**Everett D. Austin** has joined the Jones & Laughlin Ore Co., Ishpeming,

# Slime

## NO LONGER NEEDS TO BE A FLOTATION "Problem Child"

The BIRD CENTRIFUGAL CLASSIFIER takes the slimes out of your flotation feeds as clean as a whistle.

Cuts in the low micron size range are readily made.

Chemical dispersion is rarely necessary.

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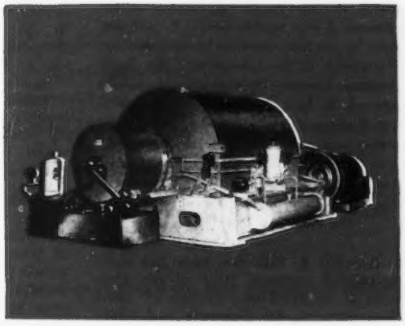
The BIRD delivers up to a ton or more a minute. It requires no more attention than a pump. Operating cost is low.

*Let us tell you more about it.*



**BIRD MACHINE COMPANY** · South Walpole · Massachusetts

The **BIRD** Centrifugal CLASSIFIER

as construction clerk, and **Peter D. Nora, Jr.**, is now a member of the research laboratory force.

**A. L. Labbe**, expert on gases and baghouses for American Smelting & Refining Co.; **C. C. Burt**, consulting engineer for the company, and **R. B. Muse**, chief engineer of the Pacific Coast Dept., are currently in New York for consultation.

**F. S. Mulock**, vice president and general manager of western operations for United States Smelting, Refining & Mining Co., will succeed M. H. Kuryla as president of the company, March 1, 1950, upon the latter's retirement. Mr. Mulock has been associated with the company for more than 29 years. He came to Salt Lake City in 1935 as assistant general manager of western operations, was made general manager in 1937 and vice president in 1938. **W. C. Page**, assistant to Mr. Mulock since 1943, will become general manager of western operations. Prior to that time he was associated with mines in Africa and Europe.

PAUL LINZ has been named chairman of the board of directors of the South American Minerals & Merchandise Corp. He will continue as personal assistant to Dr. Mauricio Hochschild in his enterprises. The South American company represents the Hochschild interests in Peru, Bolivia, Chile, Argentina and Brazil as importers of ores and concentrates, and exporters of metals, machinery, and steel products. For 17 years Mr. Linz was a partner in Carl M. Loeb-Rhoades & Co. and prior to that was an executive with the American Metal Co., Ltd.

**Howard J. Van der Veer** has been appointed regional chief of the division of adjudication, Bureau of Land Management, for Colorado and Utah. He is a geologist and mining engineer and is a specialist on mineral matters. For the past year he has served as special assistant on minerals, and in his position he will continue to be responsible for all BLM mineral activities in the Colorado-Utah area. In addition, he will supervise all homestead, rights-of-way, recreation and other uses of the public land administered by the BLM. A graduate of the Colorado School of Mines, he was formerly associated with American Smelting & Refining Co., and also engaged in private mining.

**Evan Just**, director of the Strategic Materials Division, Economic Cooperation Administration, since June, 1948, has resigned to return to the editorship of Engineering and Mining Journal. **Charles H. Burgess**, mining consultant and geologist, succeeds him. He has been deputy director of the division.

**Alfred B. Sabin**, consulting engineer of Oakland and San Francisco, Calif., recently returned from an extended trip through Canada, where he made a commercial survey for Western Precipitation Corp., of Los Angeles.

**Alexander N. Winchell**, of New Haven, Conn., has accepted an appointment as visiting professor of geology at Columbia University for the present school year.

**Charles C. Smith**, Minnesota Mining & Manufacturing Co., St. Paul, has been named general sales manager for the tape division of the company.

**Raymond H. Feierabend** is now superintendent of production for Freeport Sulphur Co. at its Grande Ecailli, La., operation.

**Walter Hull Aldridge**, president of the Texas Gulf Sulphur Co., was awarded the John Fritz Medal for 1949 at a dinner held in New York on Nov. 16. The medal, sponsored jointly by the American Society of Civil Engineers, the AIME, American Society of Mechanical Engineers, and the American Institute of Electrical Engineers, is awarded each year for scientific or industrial achievement in any field of pure or applied science. Mr. Aldridge was cited, "As engineer of mines and statesman of industry who by his rare technical and administrative skills has importantly augmented the mineral production of our country and Canada, and who by giving unselfishly of his wisdom and vision has guided his professional colleagues to higher achievements."

**Frank H. MacPherson**, former manager of the Polaris-Taku Mining Co., of Vancouver, B. C., has been appointed manager of the AEC Raw Materials Office at Grand Junction, Colo. He succeeds **P. C. Leahy**, who has been appointed chief of the Maintenance Division at the Commission's Idaho operations office, Idaho Falls. In 1943 and 1944 Mr. MacPherson was an engineer for the Aluminum-Magnesium Division of the War Production Board.

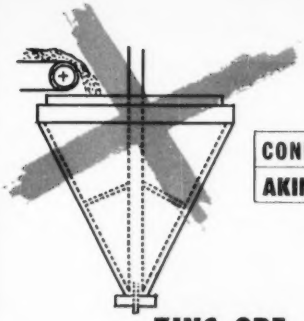
**Jim Pearce** has joined the Westland Construction Co. at Pasco, Wash., as managing engineer in charge of general construction. A graduate of the Colorado School of Mines, he worked for mining concerns in British Columbia and Idaho before becoming engineer in charge of water works construction at the Hanford Works in 1945. He has been in general contracting work for the past three years.

## OBITUARIES

CRISPIN OGLEBAY, chairman of the board of Oglebay, Norton & Co. and until recently president of the company, died Oct. 23 at his home in Gates Mills, Ohio. He was president of Columbia Transportation Co., Fortune Lake Mining Co., St. James Mining Co. and a number of lake dock companies. He was vice president and director of Castile Mining Co., Montreal Mining Co., Reserve Mining Co. and other land and engineering companies. Mr. Oglebay was also a director of Wheeling Steel Co. He served as president of Oglebay, Norton from 1924.

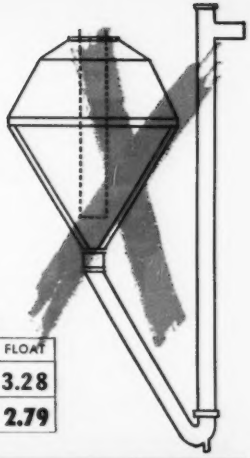
**Walter B. Congdon**, 64, former director of Calumet and Arizona Mining Co., Bisbee, Ariz, died in Yakima, Wash., Oct. 20. A graduate of Yale and Minnesota Universities, he was associated with the company between 1908 and 1931. He later devoted his time to business in Yakima and Duluth, Minn.

WALTER C. BURCHETT, 82, discoverer of the famous Sullivan mine, now owned by Consolidated Mining & Smelting Co., died Oct. 9, in Spokane. Born in Springfield, Ill., he went west in 1886 and spent many years prospecting in Idaho, Washington and Canada.



## IRON ORE

| | % WT. | | % Fe | | % $SO_2$ | |
|---|---|---|---|---|---|---|
| | SINK | FLOAT | SINK | FLOAT | SINK | FLOAT |
| CONE SEPARATOR | 75.7 | 24.3 | 56.6 | 44.7 | 12.6 | 30.5 |
| AKINS SEPARATOR | 82.9 | 17.1 | 57.3 | 39.2 | 11.8 | 38.4 |

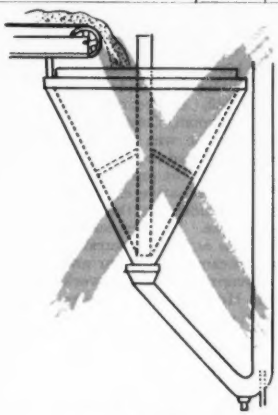


## ZINC ORE

| | % ZINC | | |
|---|---|---|---|
| | SINK | MIDDLING | FLOAT |
| AKINS SEPARATOR | 19.00 | — | 0.86 |
| AKINS SEPARATOR | 36.00 | 9.28 | 0.63 |

## GARNET ORE

| | % GARNET | | |
|---|---|---|---|
| | SINK | MIDDLING | FLOAT |
| CONE SEPARATOR | 55.0 | — | 3.28 |
| AKINS SEPARATOR | 91.5 | 32.9 | 2.79 |



# Compare the METALLURGY

**Wherever Heavy Media Separation processes are used, AKINS Separators have decided advantages over the three designs above. AKINS machines are already considered standard in treatment of iron ore, coal and garnet. New applications are being developed rapidly in other fields, especially coal treatment.**

**In an AKINS, the mechanical advantages and the metallurgical advantages over other existing types are of equal importance:**

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3. Can be stopped and started without draining.
4. Low power consumption, up to 35% less (including auxiliary equipment).

### METALLURGICAL ADVANTAGES

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1. Greater recovery of product.
2. Better grade of product.
3. The only Heavy Media Separator that can recover a separate middling product for retreatment.

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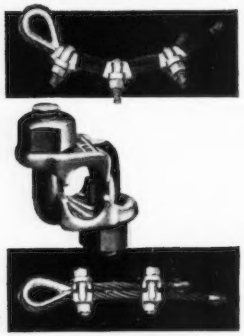

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- Fewer rope breaks . . . accidents saved
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- No special wrenches . . . tools saved

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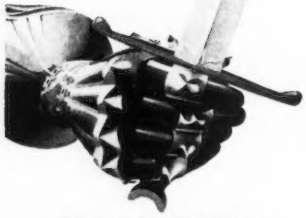

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**George Wagner,** 74, died Oct. 12, in Telluride, Colo. He went to Colorado in 1896 and worked for a year in the Revenue mine at Ouray. His first mining venture was a lease taken with his two brothers on the Smuggler dumps. From 1908 until 1934 they operated the Alta mine at Ophir.

**Charles K. McArthur,** veteran metallurgical engineer for The Dorr Co., and recently special representative of the company in Washington, Oregon and Idaho, died suddenly in Seattle, Wash., Oct. 20.

**O. C. "Heine" Wemhaner,** mining engineer, died in Kansas City, Kan., in July. He was 60. He lived in Miami, Okla., for many years before moving to Missouri, where he made his home at the time of his death. Mr. Wemhaner was an independent operator in the Tri-State lead and zinc mining area during the industry's early years. In recent years he had been engaged in open-pit mining around California, Mo.

**Errol MacBoyle,** owner of the Idaho Maryland Gold Mine, died in Grass Valley, Calif., Nov. 5. He had been an invalid for six years. A graduate of Columbia University and the University of California School of Mines, he came to Grass Valley in 1915, and with associates acquired a group of mines. He was 69.

**John N. Houser,** 67, vice president and general manager of Tennessee Copper Co., Copperhill, Tenn., died Nov. 1 in Knoxville. He was a native of Pennsylvania and came to Tennessee as general manager of American Zinc Co.'s operations at Mascot. In 1919 he was named to the position he held at his death.

**John W. Mercer,** 85, mining engineer of San Francisco, died Oct. 18. He was a graduate of the Colorado School of Mines and was well known in mining circles in the West and in South America.

**Alva D. Myers,** 77, died in Tujunga, Calif., Oct. 17. He was founder of the boom town of Goldfield, Nev.

**Victor Nelson,** formerly mining captain at the Dorland Steel Co.'s Armour No. 1 and No. 2 mines, died Sept. 14.

**Frank Rice Short,** director of the Bulolo Gold Dredging, Ltd., and Placer Developing, Ltd., Vancouver, B. C., died Nov. 4 in Atherton, Calif. He was 73. At one time he was retained by the Pato Consolidated Gold Dredging, Ltd., in Pato, Colombia, to study recovery methods.

**Hyrum Petersen,** 68, widely known as an explosives consultant in the western states, died Oct. 26 in Salt Lake City. He joined the Independent Powder Co. of Joplin, Mo., in 1910 and when the company was acquired by Hercules Powder Co., he remained with the firm. He retired as a sales representative and explosives expert for Hercules, Jan. 1, 1948.

**James R. Hobbins,** president of Anaconda Copper Mining Co. since 1940, died of a heart attack in Butte, Mont., on Nov. 15. He was one of a number of the company's New York executives visiting the Montana properties on a routine inspection tour. His age was 66.

Mr. Hobbins, widely known in mining circles for his fine character and fair dealings, became president of Anaconda in 1940, succeeding the present board chairman, Cornelius F. Kelley. Previously he was executive vice president. He joined the company in 1922 as assistant to the president.

Mr. Hobbins was a native of Madison, Wis., and a student at the University of Wisconsin. His first subsequent activity was as a fire insurance agent, then he became a surveyor and construction engineer. This work brought him to Montana in 1912, when he joined the Great Falls Power Co., now merged into Montana Power Co. In this company he advanced to the position of manager of the Northern Montana Division.

He became a vice president of Anaconda in 1923, and was resident at Butte in charge of Western operations until 1936, when he moved to the New York office as executive vice president.

Among his other positions were: president, Butte Water Co., Andes Copper Mining Co., Chile Copper Co., and Chile Exploration Co.; vice president and director, Butte, Anaconda & Pacific Railway; director, Mines Investment Corp.; Copper Export Association, National City Bank of New York, American Brass Co., Anaconda Sales Co., Anaconda Wire & Cable Co. and International Smelting & Refining Co.

Only about an hour before he died, Mr. Hobbins gave authorization for work to be resumed at the Greater Butte Project and that the Belmont copper mine would reopen.

He was a member of Kappa Sigma fraternity and maintained membership in a number of clubs, among them the Butte Country Club, the Montana Club in Helena, India House in New York, and Sleepy Hollow Country Club in Scarborough, N. Y.

Mr. Hobbins is survived by his wife, daugher and son-in-law, two grandchildren, and several brothers and sisters.

# *The* Labor Union Monopoly Bites *ALL* Workers

*What kind of government is it which:*

**. . . Prosecutes the Great Atlantic & Pacific Tea Company which it asserts handles about 6½% of the retail food distributing business as an illegal monopoly in restraint of trade, and**

**. . . Seeks to break up four big meat packing companies and make them into 14 companies, charging the four with being a monopoly in restraint of trade, but**

**. . . Makes no move whatsoever to apply the federal anti-trust laws to the exercise of virtually 100 percent monopoly control of labor in the coal industry, and the only slightly less complete monopoly control of labor in the steel industry?**

The answer to that question is simple. It is class government of the most flagrant type, a government by which special privileges are dispensed without justice and to the great injury of all workers. It is the kind of government which will lead to the early sacking of the American enterprise system and the personal freedoms of workers.

In legal terms the explanation of this flagrant affront to good government is also simple. In 1932 labor union activities were given virtually complete exemption from the application of the federal anti-trust laws by passage of the Norris-LaGuardia Act.

continued on next page

When the Norris-LaGuardia Act was passed labor unions were relatively weak. Only about 16% of the nation's industrial workers were organized, only about 12% of the steel workers. About two-thirds of the coal miners were union members, but only half that number were paying dues. The country was in the depth of its worst depression. The unemployment of about one-fourth of the labor force made monopoly control by labor seem so remote as to be almost fanciful.

But after only seventeen years devoted to the promotion of labor union organization by the federal government, we have labor monopoly with us. In its power and scope it makes the alleged business monopolies being prosecuted under the federal anti-trust laws seem positively piddling. In its manners it makes the old-time business monopolists look like Lord Fauntleroys.

What is lacking, grievously lacking, is action by Congress; action to shape our federal anti-trust laws to take account of the labor monopoly that has become the dominant national force in our country today—a force that is leading to the loss of freedom of all workers.

**Before labor monopoly is broken up, as it must be broken up if our economy is not to be permanently wrecked, other steps will no doubt be required. But one test more than any other will be the touchstone of the nation's determination to keep its economic and personal freedom. It is what it does to see that labor monopoly receives the same treatment under the federal anti-trust laws as any other kind of economic monopoly.**

The purpose of the federal anti-trust laws is to break up monopoly and preserve fair competition in the United States. It is a fine purpose. The wisdom and fairness of its application in particular cases is often open to challenge. But in spite of bad administration every farsighted business man I know is a staunch defender of our national anti-trust policy.

At present, in the exemption of labor monopoly, we have a breach in that policy which, if not closed, will soon become fatal both to the policy and the enterprise system it is designed to foster and protect.

The main thing wrong today with Great Britain and indeed all Europe is that no effective anti-trust laws are in existence to protect the public from business and labor monopolies, to guarantee personal freedoms. No free economy in Europe or America can prosper as long as protected monopolies remain and flourish.

**While your representatives in Congress are home with you talk to them about the special privileges now granted to labor union monopoly. You would serve your country well by finding out what they intend to do about it before it is too late.**

*President, McGraw-Hill Publishing Company, Inc.*

**Clifford D. Woodward,** 71, chief engineer of Anaconda Copper Mining Co., died suddenly Oct. 26 in Butte, Mont. A native of Norwalk, Ohio, he early became interested in electricity, and in 1902 became associated with the Anaconda company, at Great Falls. In 1918 he came to Butte as electrical engineer and was appointed chief engineer in 1927. He was a personal friend of the late Thomas A. Edison and helped to develop the Willard automobile battery.

In a statement concerning his many accomplishments, E. S. McGlone, vice president of Anaconda Copper Mining Co., in charge of western operations, said:

"Mr. Woodward was considered one of the outstanding industrial engineers of the world. His work with the Anaconda company included the design and construction of mining and metallurgical plants in South America, Mexico and Europe as well as in the United States. His advice was constantly sought by many other large industrial and manufacturing companies, and he has contributed a great deal to the industrial development of the world, and in many instances he was responsible for improved designs of mechanical equipment and metal alloys used for the manufacture of this equipment. His loss will be mourned not only by his friends and close associates in the Anaconda company, but by the entire industrial world."

**Thomas Arnold Dickson,** president of Colorado Iron Works Co., died Oct. 19 in Denver, Colo., following a lingering illness. He was 63.

Ted Dickson, as he was known to


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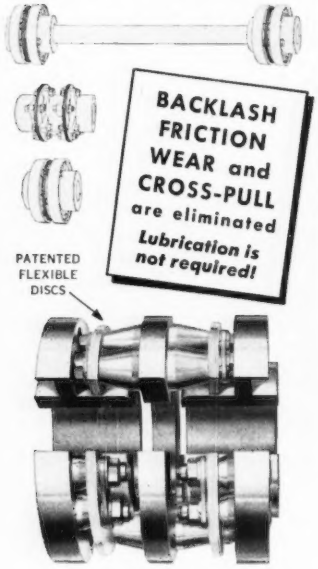


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the mining world, was born in Leadville, Colo., and his career, a brilliant one, was in the familiar American tradition of coming up the hard way without benefit of formal technical training. Unable to complete his education he started as a smelter chemist's assistant and at the age when many young men are starting professional careers he was in charge of smelters in Mexico and Arizona. Later he branched into cyanide work on the Comstock Lode. For a short period employment on operating assignments he worked for Colorado Iron Works Co. as a salesman of metallurgical equipment and this laid the ground work of what was later to be his life work.

In 1917 he returned to Colorado Iron Works as general manager and eventually acquired ownership of the company. His career as a machinery manufacturer is without parallel and he was largely responsible for the merging of various manufacturing plants in Denver into what is now known as the General Iron Works, of which he was vice president at the time of his death.

Few men knew the smelting and milling business as well as Ted and he was responsible for the development and wide acceptance of the Akins Classifier. His inventiveness is witnessed by the ownership of various patents relating to roasting and classification processes, and he was always on the alert to improve his company's products.

**Solomon R. Guggenheim,** the last of the seven well-known brothers, died Nov. 3, at his estate at Sands Point, Port Washington, Long Island. He was 88 years old. Son of Meyer Guggenheim, he was born in Philadelphia on Feb. 2, 1861. He was educated at public and private schools there and also in St. Gaul and Zurich, Switzerland. His father, during the 80's became interested in mining enterprises in Colorado, namely the A. Y. and Minnie mines at Leadville. His cautiousness prevented him from investing, however, before one of his sons had looked over the property and advised on its prospects. In this manner the seven brothers learned mining.

In 1889 Mr. Guggenheim went to Leadville for a year to watch the operation of the A. Y. and Minnie mines, as well as the Philadelphia smelter which had been set up there. He went to Monterrey, Mexico, in 1889 to take charge of the building of the first lead-silver smelter and remained there until 1895. In the meantime, in 1891, he negotiated the purchase of a copper mine for the firm. In that undertaking a copper smelter was erected by the brothers under his direction at Aguascalientes, Mex. The firm's business was merged with American Smelting & Refining Co. in 1901.

After the death of their father the brothers set up the firm of Guggenheim Brothers. It was designated as a mining company, but moved gradually into the field of finance and banking.

In 1945 the Government of Chile recognized his service to that country by making him a Commander of the Order Al Merito.

## William H. Crago

On July 12, 1949, while still in the active practice of his profession, William H. Crago, consulting mining engineer of Duluth, Minn., died suddenly at the age of 69. The development of the Lake Superior region took place largely during his generation; he was born in Newcastle-on-the-Tyne, England, of a mining family. As became his antecedents, he was endowed with great power of labor from his youth on up. A man of strong mind and keen insight into any problem that he approached, he had an inflexible integrity in the face of the temptations that come to all who have to do with the development of mines.

Bill Crago was reared at Norway, Mich., and finished high school in Iron Mountain. The mining engineers and lawyers in that time took pride in being members of the school board and the quality of the faculty gave evidence of their interest as reflected in stories that are told of these early days. Crago was educated technically at the University of Michigan, and the Michigan College of Mines where he was graduated as engineer of mines. He went to work as a miner in the Chapin mine, which under T. F. Cole and James McNaughton was then the first training ground of many mining men.

Becoming engineer at the old Mansfield mine in the Crystal Falls district, Michigan, he remained with the Oliver Iron Mining Co. for about 15 years. During the latter 10 years of this period he was located in Duluth in direct charge of long-extended explorations on the Mesabi Range. As an associate of J. Fred Wolff, he took part in determining the geological subdivisions of the Mesabi iron formation.

After leaving the Oliver company in 1917, he directed diamond-drill ex-

plorations for the Katanga Copper Co. in the Belgian Congo, having complete responsibility in the field for the early undertakings there. The region was then a malarial frontier, remote from transportation and beset with many obstacles. In 1921 and 1922 he was consulting engineer for the South Manchuria Railway Co., in North Chino, and was a member of the American Committee for the Japanese Government investigating coal and iron mines in Southern Manchuria.

Later, establishing himself as consulting engineer in Duluth, he examined mines and reported on mineral properties on all the ranges of the Lake Superior region. His work took him also to South America, Mexico and Canada. In the 1930's, Crago took an active part in the adaptation of trucks to power-shovel operations on the Mesabi. As a result, in 1940 when further exploration was undertaken and the design of open pits was being considered on the opening of mines at Steep Rock Lake, Ont., his services were called upon and until his death his active counsel was invaluable during the course of that undertaking.

Throughout his professional career, Crago served many times as an expert witness. In this connection, an interesting story is told of Judge Flanagan, one of the early circuit judges of Northern Michigan, who later sat on the Supreme bench at Lansing. On the occasion of Crago's first appearance as a technical witness, being an uncle of Mrs. Crago, the Judge felt a kindly interest and asked him, "A little scared, Bill?" to which he had to admit that he was. "Never mind," said the Judge, "lay low, let the lawyers lead on into the technicalities, when they get into deep water, sink the boat, you can swim home and they can't." Crago was a clear-headed technical witness who had spared no effort to prepare himself, and who would not depart from the truth as he saw it. Whether on the witness stand or elsewhere, he was fearless in expressing his opinion; this he felt it became him to express all the more when it differed from your own.

Crago was an able mining engineer and an honorable associate. The material outcome of his labors was by no means inconsiderable, for upon the issue of work such as his rests our civilization. More important than this or the fine drawings and reports that he left is a certain indefinable indentation or parting in the ether that true effort leaves behind. A man he was, who despite the shortcomings of our human lot and the mischances of fate, made use to the utmost of the faculties that had been granted to him, giving generously of his hard-won knowledge to the young men that came in his path. Digging his way through many unknown stopes, he resolved as best he might, the difficulties that lay before him.

HUGH M. ROBERTS

*Duluth, Minn.*

*Continued on p.* 136

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# REGIONAL NEWS

EAGER PROSPECTORS seeking gold at Fishwheel, Alaska, took to panning at night by the light of a gas lamp. Miners who rushed to the area when a gold strike was reported, were disappointed by early assay results. (See ALASKA.)

## ALASKA

★A. C. Ammerman who has been with the government's Geological Survey reports that there are indications of Alaska-Juneau gold mines resuming operation and that the Kuhlman Enterprise may work its property near Juneau too.

★Prospectors who joined the gold rush at Fishwheel on the Yukon River about 155 miles from Fairbanks late in October feel all is not gold that glitters. According to the assay report of Professor Richard Ragle of the University of Alaska, one nugget found was brass, others were gold, but some of them were worn as if they had been carried in a poke.

★Howard M. Fowler of the Mines Department Office at Juneau has given technical assistance and has made safety inspections and surveys for placer and lode operations at new mines on Kenai peninsula. He will do similar work in the lower Yukon and Good News Bay areas.

★The main building of the Geophysical Institute at Fairbanks which was started in April is expected to be completed in June, 1950. A crew of 75 is said to be 25% ahead of schedule. The building will belong to the Government but the University will furnish utilities.

★U. S. Geological Survey has completed two topographical maps of areas in the Juneau district. These maps can be secured from the Office of Printing at Washington 25, D. C. for 25c. each.

★Grover Murther and John Myklebust have closed their operations at Blue Creek and Anvil Creek and have gone into Fairbanks.

★Landing fields in the Fortymile mining area of Alaska are to be improved soon with funds made available by the last territorial legislature according to George Schwamm, director of aviation for the Alaska and Aeronautics Communications Commission.

## ARIZONA

★Affairs of the **San Pedro Mining Co.**, operating claims in Pinal County 2 mi. from the famed Magma workings, are in the process of reorganization. The state corporation commission ordered stock placed in escrow and sales suspended until the reorganization is completed. The claims contain copper, gold, and silver deposits.

★Gila County teachers are learning first hand the workings of the copper industry through cooperation of **Inspiration Consolidated Copper Co.** at Miami. Groups are being taken into the copper workings to acquaint them with one of the county's major industries.

★Exposure of a mining swindle involving placer developments near Congress has added emphasis to the state's new "blue sky" law designed to curb shady promotions. More than $130,000 in sales were made in the Los Angeles district. The new state law sets up a stricter pattern for control and enforcement of stock sales.

## CALIFORNIA

★Some 250 lessees are producing more than 60% of the gold ore being milled in the Grass Valley district. Substantial amounts of ore from the Idaho property of **Idaho-Maryland mines** and the entire output from the Dannebroge, Empire, Pennsylvania and North Star are being mined by the lessees. At the North Star mine, ore is being produced from veins developed on the 10,250-ft. level and adjacent workings. Besides mining relatively high-grade ore on lease, many of the miners are developing milling grade quartz which probably will be mined by the companies when operating conditions improve.

★**Idaho-Maryland** has expanded work at its Brunswick and Idaho properties in the Grass Valley area, reportedly milling 600 tons of ore daily with a crew of 300 employees and lessees. The vein discovered late last year on the 2,400-ft. level of the old Idaho is responding favorably to development.

★Placer mining machinery has been installed at the Plumbago property on the Middle Fork of the Yuba River near Moore's Flat, also in the Grass Valley region. Considerable gravel is said to be available.

★Milling of dump ore was started recently at the Pine Grove gold mine on the Stirneman Ranch near Buckhorn Lodge in Amador County. **Associated Metals, Inc.**, Seattle, is conducting a three-man operation, with J. T. Bonner in charge. The reduction plant has a capacity of one ton per hour.

★A renewal of activity has occurred in the high-grade district in the Warner Mountains near Fort Bidwell in Modoc County. Surface and underground prospecting and development work is being done at the Moonlight mine by Earl Wallace, Russell Powell and Raymond Powell of Fort Bidwell, who have acquired Wellman Smith's interest in the mine. The surface has been prospected by bulldozer cuts which run across a shear zone at 50-ft. intervals. Several quartz stringers have been uncovered from which free gold has been panned. A new shaft is being sunk in the shear zone about 85 ft. south of the shaft from which high-grade ore was mined last year. Four feet of quartz and vuggy rhyolite breccia stained with limonite and carrying free-panning gold crosses

## California *(Continued)*

the shaft at a depth of 14 ft.

★**The Klondyke mine**, southwest of the Moonlight group of mines, is being prepared for operation. The milling plant is being remodeled and prospect pits being dug. A new ball mill and two Humphrey spiral concentrators were added to the mill circuit. Ed Benefiel and associates have incorporated the operation as the **Klondyke Mining and Milling Co.**

★A gold placer has been located on the San Joaquin River below Friant Dam by Fred Williams and Fred Santoni, reviving dredging in the area for the first time since 1941.

★**Anaconda Copper Co.** is resuming operations at its Darwin lead-silver-zinc property near Bishop in Inyo County. Manager Seth Droubay reported the company plans to work the mine with a crew of 125 men. The property has a concentrating mill with a capacity of 125 tons of ore per day.

Mr. Droubay added that Anaconda also was planning expansion of operations at its Shoshone lead-silver-zinc mine near Tepoca, increasing the crew from 60 to 75 men and enlarging the reduction plant. Output of lead is expected to double in the near future.

## COLORADO

★The Meldrum tunnel which has been idle and uncompleted for 50 years was designed to cut through the main range from Pandora, some two miles from Telluride, to Ironton in Ouray County and cut veins of Marshall and Savage basins in San Miguel County and the producing properties near Ironton in Ouray County. The tunnel as then planned was to be about 4½ miles long and 12x12-ft. Officials of the **Idarado Mining Co.** say the old tunnel will be equipped and driven more than half a mile eastward from Telluride to tap the Argentine vein. Fred Wise of Ouray, manager for the Idarado company, says arrangements have been made with the Western Colorado Power Co. to run an electric line to the tunnel. A road to the tunnel mouth is being improved.

★Colorado's uranium production is proving "satisfactory," in the opinion of Wallace G. Fetzger, chief of the Grand Junction, Colo., office of the Atomic Energy Commission. Mr. Fetzger says Colorado has the only important domestic deposits of uranium. Since 1947, AEC has drilled some 285,000 ft. of test holes for uranium ore. Mr. Fetzger said, "We plan to develop techniques that will enable us to drill about 400,000 ft. or 80 miles of mining holes in a year."

★**The Cripple Creek Development Co.**, under the direction of its president, Sam Bailey, is now engaged in pros-


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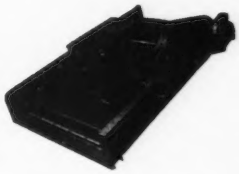

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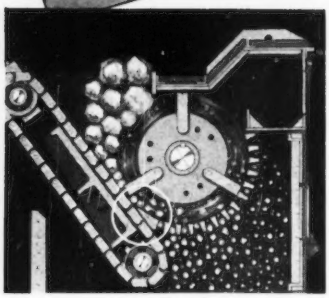

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## Colorado *(Continued)*

pecting Mineral Hill at the northwest outskirts of Cripple Creek. The Company has drilled four churn-drill holes in that area, and expects to put down several other holes in the district. The first hole on Mineral Hill was put down 35 ft., the second, 44 ft. and the third 28 ft. The fourth hole has reached a depth of 60 ft.

★Information from Washington gives assurance of the continuation of the Leadville drainage tunnel. Appropriation of $500,000 originating in the U. S. Senate, will soon be available for the project, considered of vital importance to the local mining industry, say these reports. Bureau of Mines Director James Boyd says that drilling crews will be at work on the Leadville drainage tunnel in Colorado within two or three weeks after President Truman signs the Interior Department money bill.

★Receipts at the Denver mint were as follows for September, 1949, according to Moses E. Smith, superintendent: Gold totalled 52,334 oz. worth $1,831,698. Silver receipts were 16,809 oz. worth $15,018.

★A four point monetary plan by which the United States could lead the world to peace was advocated by Merrill E. Shoup, president of the **Golden Cycle Corporation,** who spoke to the National Security Traders Association convention at Colorado Springs. Mr. Shoup recommended the following four steps: 1. The Bretton Woods plan should be abandoned completely or drastically revised. 2. The United States should establish promptly a "free market" in gold. 3. After the free market was established, the U. S. currency should be made freely and completely convertible. 4. The currency of the rest of the world should be tied to gold on the actual dollar value basis.

★**Gold Mines Consolidated** at Georgetown announces that it has just shipped its 101st lot of concentrates since production started from its Donderberg-Terrible-Mendota group of mines. A recent shipment netted the company in excess of $1,300 resulting from 36 tons of crude ore. The company has just completed mill changes to produce selective concentrates.

★Fred Sturm and Floyd Ruby, owners and operators of the **Small Spot Mining Co.** in the Calamity uranium district near Gateway, are enlarging their operation and have leased a group of eight carnotite claims on Blue Creek, 14 miles up the river from their present operations. They will continue to operate the Small Spot mine but will center their operations on the Blue Creek claims. The Small Spot Co. has been one of the largest producers of uranium-vanadium ore in the Colorado Plateau area for the past several months. It plans to expand production to 100 to 150 tons daily.

★The **Cripple Creek M. & M. Co.** has recently purchased 120 acres of ground on Mineral Hill at Cripple Creek from Jacob Wagner, and will start placer mining on the property at once, according to an announcement made by Vick Porter, superintendent. The dry land placer machine was constructed by the Mechanics Service Co. of Cripple Creek and the Universal Dredge Co. of Denver. The company is also planning the construction of a gold ore reduction mill on the Mineral Hill property, according to Porter. An ore testing laboratory has been constructed by the company at the Gold King mine. Since securing the lease on the Gold King mine the company has rehabilitated the shaft to the 10th level. Development work on the 10th level has opened a vein two feet wide which carries ore that assays 2.80 oz. of gold per ton, according to Porter.

## IDAHO

★Milling Operations are now in progress at the **Gem State Consolidated Mine** in the pearl district of Gem County after two years of intensive development work. The flow sheet at the mill has been worked out and machinery designed to handle the complex ore found in the works. Daily capacity on hard quartz will be about 25 tons, but metallurgists believe the rod mill will handle well over that amount on the soft brecciated ore. The new mine has been described as a model for a small mine. It is well equipped for efficient operation with the most modern mining equipment.

Underground works at the mine total more than 3,000 ft. Since the Gem State started development work more than two years ago, the main adit tunnel has been cleared out and retimbered. Ventilation and haulage systems have been put in first-class condition. Adequate tonnage of ore has been developed to maintain steady production and the company is already making plans to increase the mill capacity and improve the recovery percentage by the addition of a flotation process.

The company owns outright two claims on the property. W. C. Dewey is owner of five of the 14 claims which the company holds. Twelve are under a lease and option basis.

★The current strike in the Coeur d'Alene district has idled around 3,000 men. Since August 20, when the employees of the Bunker Hill & Sullivan smelter first walked out, it has spread, until it now includes the Bunker Hill mine workings, the Sunshine mine and all the properties working through the Sunshine, including Silver Dollar, Silver Syndicate, Sunshine Consolidated, Metropolitan and the "Omega" area in Polaris. The Sidney mine on Pine Creek was compelled to close, and other zinc-lead mines on Pine Creek were forced to curtail produc-

tion and development because of the low price of zinc and curtailment of output by the Sullivan zinc plant at Kellogg. Other mines in the district affected by the strike are the Dayrock, Sherman, Tamarack and Hercules mines owned by the **Day Mines, Inc.** company and the newly-opened Frisco zinc-lead mine of the **Federal Mining & Smelting Co.** Mines still operating are properties owned or operated by the Federal Mining & Smelting Co., which ship concentrates to the AS&R East Helena smelter; the properties owned or operated by the **Hecla Mining Co.**, and all the mines in the Mullan area, where the local branch of the IUMM&SW (CIO) refused to join the strike.

★**Day Mines, Inc.**, is the first mining company in the Coeur d'Alene district to introduce mill concentrate sand filling for mine stopes. The method was brought to the district by Rollin Farmin, mine foreman, from the Grass Valley mining area in California. In 1947 the Day company sent its head mining engineer, Ray Horsman, and mill superintendent, Fred Torkleson, to Grass Valley to study the method and on their return they applied the process to the company's Dayrock mine, using the mine's own concentrate tailings and waste. This material, which is about 25% solid matter, is first pumped into a large settling and agitator tank where it is allowed to settle, after which it is removed by a 42-in. impeller driven by a 25-hp. motor which mixes it to a 71 to 76% pulp which gravity flows down a 3-in. pipe line to the mine workings where needed.

★The USGS, through its San Francisco office, has started the work of remapping four quadrangles in north Idaho, including the Hope, Elmira, Mount Pend Oreille and Clark Fork, involving about 800 sq. mi.

★The Hull lease, operating in the upper workings of the old Gem mine in Canyon Creek since 1918, has been curtailed to development work only, according to H. J. Hull, one of the owners, because of the current low price of lead and zinc. The lease normally employs 30 men.

★**E. J. Longyear Co.** of Minneapolis, has taken a contract to sink the Whitedelf shaft in the Clark Fork district an additional depth of 600 ft., bringing the shaft to the 1,050-ft. level, according to Compton I. White, secretary of the company. From the surface down to the present 450-ft. shaft level the company has produced a large tonnage of good ore and concentrates.

★**Sun Valley Silver-Lead Mining Co.**, of which Ross Roundy of Wallace is president and general manager, is planning the erection of a 100-ton milling plant early next Spring. The company recently completed a new cross-cut tunnel and opened the company's vein at considerable depth. Drifting on the structure is now going


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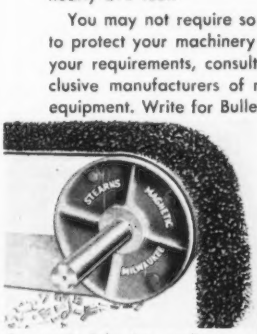


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SURFACE PLANT of the Gem Consolidated mine, five miles west of Horseshoe Bend, Idaho, is now in operation. Mill is in foreground with change room behind it.

## Idaho *(Continued)*

forward and the company is hand-sorting and shipping the high grade and stockpiling the milling ore. The mine is in the Hailey district.

★**Victory Divide Mining Co.**, a Nevada corporation, has taken an option on the Red Bird mine in Idaho, according to Dean G. White, of Spokane, president.

★**Sunshine Mining Co.**, which recently reported radioactive rock indications in its mine, is now prospecting for radioactive minerals in the Boulder area in Montana under the direction of Rowland King, Sunshine's chief field geologist. The Sunshine company has made arrangements with the **Elkhorn Mining Co.** of Boulder to prospect the Free Enterprise group of mining claims where an old shaft is reported to contain radioactive minerals. This shaft will be cleaned out and developed to greater depths. No commercial uranium ore has yet been found, but rock on the old dump is said to be radioactive.

★**Highland-Surprise Mining Co.**, on Pine Creek, is diamond drilling for a silver-lead vein located this summer by geologists while tracing the Government Gulch fault from the Federal company's Page mine. Bulldozing the outcrop of the new vein uncovered ore assaying 3% lead, 3 oz. in silver and considerable zinc. The Highland-Surprise company has temporarily closed its milling operation and is concentrating its efforts on new development work. This work will include opening the main orebody on the 1,300-ft. level. On the 1,150-ft. level this oreshoot was 320 ft. long and 18 ft. wide.

★**Clayton Silver Mines Co.** recently extended its main working shaft from the 300 to the 400-ft. level and in driving a northerly crosscut on the new level to determine the downward extension of a shear zone has encountered what is apparently an entirely new orebody, according to W. M. Yeaman, president.

The new orebody corresponds in size and shape to two other orebodies worked out on the 300-ft. level but does not parallel either one of them.

"The Clayton orebodies," says Norman Smith, geologist in charge of the development, "are not properly described as veins, although the word is sometimes used for want of a more expressive one. The ore occurs in vertical position in a limestone country rock, the sides and end of the deposits being fairly regular. The bodies already being mined are around 30 ft. wide and 100 to 125 ft. long, extending downward for at least 400 feet. What we call the 400-ft. level is actually 150 ft. below the 300. The ore carries galena and sphalerite."

## IRON COUNTRY

★**Peter Kiewit Son Co.** has a stripping contract at the **Stanley Mining Co.'s** Mary Ellen Mine near Biwabek on which work was begun in August.

★As it has been for several years past, the **Interstate Iron Co.'s** Hill-Annex mine at Calumet is the No. 1 shipper from State fee owned properties. **Pickands, Mather & Co.'s** Scranton Mine at Hibbing is No. 2, and **M. A. Hanna's** Kevin mine at Cooley, No. 3. In total shipments the Mesaba Mountain is still far ahead of the field with about 72,000,000 tons as compared to approximately 58,000,000 tons from the Hill Annex.

★The 1150B dragline worked at the South Agnew throughout September moving 536,514 cu. yds. About 135,700 tons of ore was shipped from the

property by 120B and 170B standard shovels.

★**Interstate Iron Co.'s** Longyear mine at Hibbing of which John F. Linden is superintendent was awarded the Admiral Safety Award. On Aug. 15, 1949, it completed one year without a lost-time accident.

★Development work at the **Jones & Laughlin Ore Co.'s** Vicar mine at Wakefield has increased the pumping load from 740 gpm. to over 1,500 gpm. A conveyor is being built from the shaft to the stockpile ground, and a contract has been let to the Koshak Bros. to construct 2½ mi. of railroad from south of the Manly Siding on the C. & N. W. Railway to the mine.

★As of Sept. 1 four shipments from the Menominee Range docks at Escanaba were 2,902,757 tons.

## KENTUCKY-ILLINOIS

★Recent prospecting in the Hardin and Pope fluorspar area by Arthur J. Lay, of Ridgeville, Ind., and a group of associates has resulted in purchase of mineral rights in approximately 500 acres in the two counties. C. R. Milburn, of Williamsburg, Ind., acquired 216 acres, near Shetlerville, from Newt Parkinson; 90 acres from Albert Raines; 200 acres from John E. Rotes, all tracts in Pope County, and a 40-acre tract from Loren Hufsey, in Hardin County.

★**Minerva Oil Co.**, fluorspar operator in the Cave-in-Rock district, recently purchased two Allis-Chalmers ball mills and a Western Machine classifier which are being installed with a view to increasing the tonnage milled. Installation was scheduled for completion about Dec. 1. After a delay, Minerva has resumed the sinking of a 580-ft. escape and service shaft at its Cave-in-Rock plant. **Minerva Oil Co.'s** extension drilling in the Potosi, Mo., lead and zinc area with five churn-drill rigs in operation will be completed about the first of the year.

## MICHIGAN

★With the delivery of 100,000 tons of coal to their mines, the **Calumet & Hecla Consolidated Copper Co.** has announced that it will be able to continue operations throughout the winter. As of Oct. 31, work was on a 40-hour week basis.

★**Calumet & Hecla** which owns a total of 250,000 acres of minerals, timber and recreational land in Houghton and Keweenaw Counties has adopted a new policy whereby it will give liberal long-term leases on lake frontages as other desirable recreational sites. This will bring added revenue to the company and to the district as well. A special company department has been set up to handle the recreational project.

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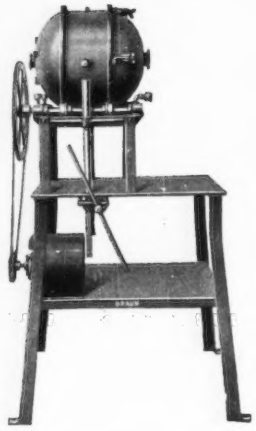

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## MONTANA

★**Martin Mining Co.** with headquarters in Kalispel reports the encountering of high-grade silver ore on its claims in the Hog Heaven district of Flathead County. The company is doing a substantial amount of development work.

★I. G. Irving, Butte mining engineer, and a group of mining men are carrying on extensive development work at three mining properties, all of which were producers in the years past. The group has completed shaft sinking at the Pyrenees Mine near Georgetown, Deer Lodge County. Cross-cutting is going on to open up a gold vein beneath the old workings. At the Spar mine 17 miles west of Toston in Jefferson County, a shaft is being sunk on ore below the 250-ft. depth and shipments of silver ore are going out regularly.

★The U. S. Bureau of Mines is diamond drilling the Norwich Mine in the western part of Butte. Object of the diamond drilling is to determine the extent of rhodochrosite ore reserve in the property.

★Waldemar Sandquist and George Meyer of Basin and Paul Williams of Helena have taken a lease on the Comstock ground of claims, three miles north of Basin, Jefferson County. Lessees claim that uranium ore was discovered here in the early part of 1949.

★According to reports from Boulder, Jefferson County, Rowland King, head of the exploration department of **Sunshine Mining Co.** at Kellogg, Idaho, is supervising the further sinking of a shallow shaft on the Free Enterprise-Silver Bell group of claims on the outskirts of Boulder. A few months ago radioactive minerals were reported on that group of claims.

★Fred C. Schmidt and Clarence Searle have reported a surface discovery of uranium oxide in the Rocky Boy Indian Reservation on the border of Hill and Blaine Counties. Assay is said to be 0.13%.

★The properties formerly operated by the **Saranac Mining Co.** near Maxville have been leased by a syndicate headed by Henry T. Born of Spokane. The syndicate expects to recondition some of the mine and mill equipment and start operation soon.

## NEVADA

★Charles Joseph and Partners are shipping about 300 tons from their lease on the **Tonopah Divide Mine** to the McGill Smelter of **Kennecott Copper Corp.** near Ely. Mined from a vein which varies in width from 8 to 18 ft., the ore carries considerable silver and is reported to be a good mill product. The lessees intend to resume mining the orebody in a few days.

★The opening of the **Gracie Gold Mine**, one mile southeast of Nevada City, has been completed. Head frames and surface buildings have been erected and power units installed. The management reports this work costs approximately $35,000 and the initial phase of the operation is expected to cost an additional $50,000. New developments include driving a cross cut from the 350-ft. level of the shaft to locate an extension of the orebody.

★Preliminary work to put the old **Jumbo Extension mine** back in operation was begun last week. The owner, Martin C. Duffy, plans to repair the collar and do whatever retimbering is necessary to put the three-compartment shaft in working order down to the 790-ft. level.

★Hopes for new supplies of low-cost power to make possible the development of millions of tons of new ore deposits have brightened in Nevada as the result of a report issued to Gov. Vail Pittman by A. M. Smith, state engineer.

Outlining developments which he said might ultimately release needed power to permit large-scale mining, industrial and agricultural development in west-central Nevada, Smith listed the following projects now under construction or consideration:

1. Folsom Dam on the American River in California, originally designed to create 360,000 acre-ft. of storage, is to be enlarged to create a 1,000,000-acre-ft. reservoir with a power plant capacity of 200,000 kw.

2. Bureau of Reclamation officials are planning to seek funds for construction of three more power plants on the American River above Folsom Dam which would generate a minimum of 150,000 kw. One of the plants would be only about 25 mi. from the south end of Lake Tahoe.

3. Completion of an interconnecting link from Shasta Dam into Oregon with Bonneville Dam and the power development system in the Columbia River is being planned for the near future by various federal agencies.

The American River plants will be connected with the Central Valleys system by a 230-kv. transmission line. If conditions justify, Smith's report says, this line could be extended northerly around the south end of Lake Tahoe and on into the Carson City-Minden area. A substation could be built at that point to serve Eagle, Carson, Antelope, Smith and Mason valleys.

From those points a main line could be extended to Eureka and Austin if markets there indicated "break-even" economics. Mining operators at Eureka have assured the bureau that they will take at least 10,000 kw. for their operations. Large scale mining operations were brought to a halt in the Eureka area during the last year as a result of an absence of low-cost power.

Smith's report also cited the indus-

trial potential of a 50,000,000-ton deposit of 1.08% copper ore near Yerington, which is controlled by the Anaconda Copper Co. With copper at 20c. a lb. and a yield of 20 lb. per ton, ample low-cost electricity could mean years of profitable operation for this property, Smith said, and the eventual production of $200,000,000 worth of copper.

A serious problem, Smith pointed out, would be that Nevada would derive no tax revenue from the project. Compensation for this might be made by a tax per kilowatt-hour which would require amendments to the present state law.

## NEW MEXICO

★Although activity in copper production is at a painful low in New Mexico, considerable development work is going on in the potash district near Carlsbad. Altogether, six new shafts are in the process of construction.

**Potash Company of America** has practically completed its No. 4 shaft, after having a lot of trouble with quicksand and water. But the company is planning a fifth shaft.

**International Minerals & Chemical Corp.** has ring-drilled and grouted out a new third shaft.

All three of the original companies (including **United States Potash Co.**) have had trouble with water or quicksand or both in recent developments. It is said that if they had run into this much trouble on the original shafts, the potash industry in New Mexico might have got a much slower start. Original drilling simply missed pockets of quicksand and water that are now showing up. It is reported that the Potash Company of America spent over $700,000 on its troublesome fourth shaft, recently completed.

**Duval Gulf Sulphur Co.** and **Southwest Potash Co.** have both been drilling in the potash district.

★**International Union of Mine, Mill and Smelter Workers** (CIO) called a strike Nov. 19 at the mines and plants of United States Potash Co., International Minerals & Chemical Corp., and Potash Company of America.

★**Portales Mining Co.**, which is processing a complex fluorspar-barite-lead ore from the Hansenburg district at San Antonio, to get the lead, is now remodeling its mill and putting in a jigging plant in the hope of separating barite and fluorspar. They could then market all three minerals.

**Erwin & Bishop**, of Houston, which several years ago took over the Mex-Tex and Royal Flush leases in the Hansenburg district east of San Antonio, and which has a plant at San Antonio, is handling similar ores. If a good separation process is worked out, Mudrite Chemicals, of Hatch, will ship barite to San Antonio for recovery.

★Montgomery Drunzer is shipping


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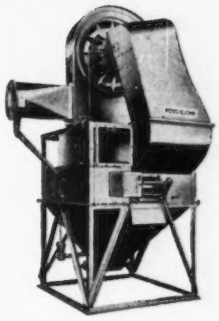

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**Question No. 1**—What efficiency can be expected from a wet-type dust collector on extremely fine dust?

**Answer**—Scores of Type W and Type N Roto-Clones are functioning daily at better than 98% efficiency on small micron particles such as found in foundry sand handling systems; ore crushing and screening; material drying, roasting and sintering operations. In fact, it is not uncommon to obtain efficiencies of 99.5% on such applications.

**Question No. 2**—Does operation of wet-type dust collectors require a large volume of water?

**Answer**—The Roto-Clone system of bringing the dust to the water makes effective use of every gallon supplied. That's why the Type W Arrangement A requires the supply of less than ½ gallon of water for each 1000 CFM of dust-ladened air cleaned.

Where water disposal is a problem, the Type N Roto-Clone is available. This unit recirculates the water without aid of pumps or nozzles. Water consumption is limited to the small amount required to provide for evaporation.

**Question No. 3**—Is wet-type dust collection expensive?

**Answer**—The cost of a Roto-Clone system is no more than that of other dust collectors of comparable efficiency. Actually, due to the small space requirements and factory method of assembly, the installed cost of a Roto-Clone is usually less.

***Roto-Clone is the trademark (Reg. U. S. Pat. Off.) of the American Air Filter Company, Inc., for various dust collectors of the dynamic precipitator and hydro-static precipitator types.***

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## New Mexico *(Continued)*

siliceous copper from Organ, taken from the old Torpedo mine dump, to the **American Smelting & Refining Co.** at El Paso.

★**Great Lakes Carbon Corp,** is building a $75,000 crushing plant at Socorro, and plans to ship perlite in three sizes—plus ⅛ to minus ¼; plus 100 to minus ⅛; and —100. Phil LeBaron is manager.

Increasing interest is being shown in perlite production in New Mexico as the market broadens in the east.

★Shipments of pumice from New Mexico have been stepped up in 1949, particularly due to entry into the field of the **Santa Fe Pumice Co.,** with mines in a 5,300-acre tract 27 mi. west of Santa Fe. The company is shipping six grades of product from its new storage and grading plant. Storage capacity is 3,600 cu. yd. The plant is constructed against a steep mountainside and extends 500 ft. from top to bottom. Handling is all by gravity. Storage bins are constructed of pumice concrete.

It is estimated that pumice shipments from New Mexico will total up to 200,000 tons in 1949.

★New Mexico state mine inspector, John Garcia, has announced that total mine production for the 1948-1949 fiscal year fell about 8% below the previous year's production.

Previous year's total: $92,693,429.

This year's total: $84,897,075.

Potash production led in total value with $33,529,132. Copper was second with $27,391,921. Zinc third with $10,545,319.

Decline in metal markets was blamed for the drop.

## NORTH CAROLINA

★**Blue Ridge Minerals & Mining Co.** of Forest City, N. C., has just been formed by Thomas J. Moss, Oscar J. Mooneyham, and Carl Huntley to mine, develop, process and market "any and all kinds of minerals, metals, gems, ores . . . metallic and nonmetallic." About 15,000 acres of land in western North Carolina has been bought or leased for mining purposes.

## OREGON

★**Porter & Co.** will continue dredging operations on Olive Creek in Grand County next season. In 1950 the dredge will be used on Crane Creek also, according to the order.

★Success is reported in placer operations conducted this year by Anthony Brandenthaler on ground in the Virtue Flat district of Baker County. Operations have been suspended for the winter, but will be resumed next spring, with a larger pump installed.

★A small mill has been constructed by Kenneth Grabner and Ralph Leonhardy at the Thomason mine in Baker County, opened last year. It is planned to operate the Grandview mine, adjacent to the Thomason claims, in conjunction with the Thomason operation. Grabner owns the Grandview property.

★Sawed blocks of volcanic tuff are being produced by **Tuff Stone Co., Inc.,** Portland, at a quarry near Sublimity, Marion County.

★As a result of preliminary testing, Andrew Murray and associates plan to conduct a thorough testing program next spring on potential dredge-placer operation in the Greenhorn area of Grant County in eastern Oregon.

## TENNESSEE

★**N. T. Dixon Chemical Co.** has purchased from the Tennessee Valley Authority the mineral rights on an 18-acre track of phosphate land in Johnson County. The company plans to install a plant at the site for producing Superphosphate by a fusion process that will not require the use of acids.

## UTAH

★Discussing complaints of Utah uranium-vanadium prospectors immediately following a tour of the southern sector of the state, James K. Richardson, secretary-manager of the Utah Mining Association, termed many such complaints against ore-purchasing companies, the AEC and other Government units "quite valid."

Richardson expressed belief that several hundred small operators are "in real need of technical help and assistance in determining the value of their mines." He noted feeling that ore payments should be higher, or that other allowances should be liberalized. Richardson also sees a "vital need for ore assay stations in the region to expedite exploration work."

In studying recent complaints in the Utah region, Richardson says he believes miners get a fair valuation from purchasing companies when ore is shipped to Monticello, Utah; or to Uravan and Paradox, Colo. He noted that AEC field men do offer technical assistance to many operators, but added that the average uranium mine in the region is a one to three man affair on one or two claims, and that the AEC is finding difficulty serving the field with present staffs. Due to the nature of the low-grade deposits of uranium ore found in the carnotite region, mining is largely a pick and shovel operation. The time lag at present between getting assays from mills or the AEC and continuing pros-

pecting work frequently means sizeable losses to these small operators.

In some cases, difficulties arise due to the distrust of small operators towards AEC field men who offer assistance, with miners suspicious of "outside interference."

For this reason, according to Richardson, small prospectors might be aided through training of locally-known southern Utah field men, or through the University of Utah geology department.

He likewise expressed belief establishment of ore sampling stations in the immediate area would facilitate assaying and quash suspicion of Government men assigned from Grand Junction, Colo. Another source of friction is a 20% penalty for lime found in vanadium. He pointed out that many small operators don't know how to determine whether they are mining in lime. The 6c. per ton-mile haulage expense awarded for hauls to the mill likewise hardly compensates for roads that must be developed from many claims, or for depreciation to trucking equipment due to the rugged terrain.

Richardson, while noting the difficulties confronting the Government in trying to allay miners' complaints points out that, while it is possible for many miners to make a living in the field, their share of the billions being spent on atom research and other phases of uranium production seems small.

★Operations at **Chief Consolidated Mining Co.** leases at Eureka were suspended from Oct. 19 until No. 1 due to an oversupply of ore at the **Combined Metals Reduction Co.** mills. The temporary layoff affected 175 men.

★Officials of the **Columbia Iron Mining Co.** report that plans for taking iron ore from company deposits in Iron County were delayed by the nationwide steel strike. Removal of iron ore had been scheduled for November, but the date at which production will begin is now listed as uncertain.

However, stripping of an estimated 3,000,000 cu. yd. of overburden from the deposits continued throughout the strike period. The stripping work has been handled by the **Utah Construction Co.**, which was not affected by the walkout.

Deposits under development are known locally as the Deseret Mound. Known for many years, they've been held in reserve by Columbia to provide needed ore for the **Geneva Steel Co.'s** operations near Provo. While development of the ore will not increase the over-all production of iron ore for Geneva, it is expected they will provide an opportunity for more selective mining, and will aid in the conservation of present workings.

★**Kennecott Copper Corp.'s** $16,000,000 electrolytic refinery at Garfield was more than 60% complete as of Nov. 1, according to Louis Buchman, general manager of the Utah Copper


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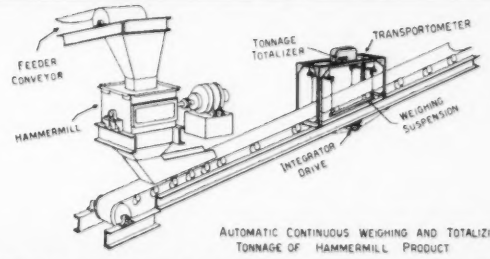


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THIS CONCRETE ORE BIN is under construction at the property of Pend Oreille Mines & Metals Co. in the Metaline district of Washington. (See E&MJ, July, p. 105.)

## Utah *(Continued)*

Division. All major buildings except the boiler plant and chemical research laboratories are finished. However, complex installations necessary to plant operation mean the refinery will not be ready for its initial runs until the fall of 1950.

Some delays in boiler plant erection likewise may result from the steel strike.

At present, placement of 1,346 electrolytic cells in the refinery "tankhouse" has been finished, with electrical installations now under way. Six 2,000-kw. motor generator sets will provide low voltage, high amperage current needed to reduce poled copper to refined copper. Poled copper anodes, 36 to a cell, will be produced from blister copper at the **American Smelting and Refining Co.** anode bar plant now being built at Garfield at a cost of $3,500,000.

★Howard J. Van der Veer, Bureau of Land Management regional chief for the division of adjudication, has reported in Salt Lake City that applications for patents on upwards of 30,000 acres of land in the Utah-Colorado district adjacent to Rifle Oil-Shale deposits have been made in the past five months. Only 10,000 acres were sought under patents during all of 1948. The boost in patent application is seen as a direct result of successful Government work with oil-rich shale deposits along the so-called "mahogany marker" near the state border.

However, it is being pointed out in both Utah and Colorado mining circles that assemblage of large land blocks in the region are complicated by many claims existing under the 1872 mining law. Some 2,700,000 acres in Utah and 1,172,778 acres in Colorado have been withdrawn by the Federal Government for filing upon as potential oil-shale lands. Filings for these acres are governed by the 1920 mineral leasing act. While no application has been received in Utah for maximum individual leases covering 2,500 acres under that act, "we expect some," Mr. Van der Veer stated in late October. Interested parties are reported examining much of the Utah acreage despite lack of private refinery facilities to date. Patent work in the area has been carried out recently by Union Oil, Sun Oil, U. S. Oil Shale Co., Federal Oil Shale Co. and "a number of individuals," according to Government sources.

★**E. J. Longyear Co.** and **Consolidated Goldfields of South Africa,** lessees of properties in Utah's Eureka mining district, have temporarily suspended exploration on leases from the **Chief Consolidated Mining Co.** in that area. Longyear field representative Lee Armstrong said a drift being worked prior to the shutdown from the Chief's workings to the mineralized section being sought had reached 2,000 ft. in length. The work was being carried on off the Chief's 1,800-ft. level. While some encouraging mineralization had been noted, Armstrong noted that the area diamond drilled and churn drilled had not been intersected. "We might be within 100 ft. of it or farther away," he stated, pointing out that some deviation had apparently occurred in the drifting.

It has been privately estimated that work carried on to the date of suspension cost over $60,000. The question of resumption of exploration rests with additional financing and study of geology.

## WASHINGTON

★**Pend Oreille Mines and Metals Co.** inclined shaft at Metaline Falls was concreted down to 1,600 ft. in October. It is being driven at an angle of 16 to 18 deg. and when completed

will be approximately ½ mile deep. The new mill with two, 800-ton units is expected to start up in July, 1950. This will be an addition to the 700-ton mill being used. All production from development work amounts to 16,000 or 18,000 tons per month. Hydroelectric capacity is being doubled by enlarging the tunnel from the Pend Oreille River. Between 4,000 and 5,000 kw. will be available when the new turbine and generator are completed.

★**Reeves MacDonald Co.** mill which is controlled by the Pend Oreille is operating its first 500-ton unit on a three-shift basis with 150 men working 44 hours a week. According to reports from Metaline Falls the second ball mill should be operating by January 1.

★**Metaline Mining and Leasing Co.** resumed production at its Metaline Falls property Oct. 1. A crew of 34 is employed underground. Daily production of 150 tons of zinc-lead ore was expected to be reached at an early date. Operations were suspended more than two years ago when Government subsidy payments were ended for zinc producing. Later the strike at the Grandview mine prevented planned resumption of production because the company had already shifted to the Grandview mine.

★About 150 men are again employed at the Grandview mine near Metaline Falls. Production is nearly the 600-ton daily rate of the period before the 14-month strike. Installations and improvements made during the strike will increase capacity 150 to 200 tons daily. Development is continuing on lower levels, but present ore is being taken from the upper level.

★**Northwest Magnesite Co.**, employing from 300 to 400 men at its mines and mills near Chewelah, stopped all its operations on Oct. 24 for the duration of the steel strike. They retained only a skeleton crew. According to Howard Ziebell, general manager, the company continued operations until all storage space had been used.

★**Eagle Mountain Mining Co.**, which is acquiring property on the west slope of Eagle Mountain near Chewelah claims to construct a 250-ton concentrator getting power from the Washington power line. The company has taken over the United Copper mine and in addition it has the Amazon and Copper King mines. The new mill should be operating early next year. A long tunnel will be driven 600 ft. into the mountains at the independent property above the United Copper and a vertical depth of 1,500 ft. will be reached on this orebody.

★Finding of commercial quantities of beryllium has been reported at Earl Cannon's mine, 18 miles north of Chewelah.

★Production of iron ore in the st. totaled 5,364 tons in 1948, compared to 2,268 tons the previous year, ac-


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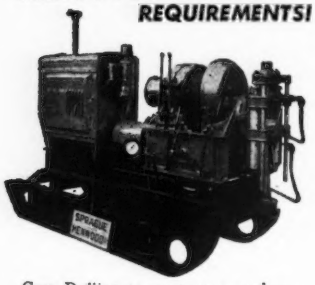

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## Washington *(Continued)*

cording to U. S. Bureau of Mines. Gold production in the State during August amounted to 5,170 oz., an increase in output of 19% over the previous month.

★On Oct. 25 the AEC confirmed expansion plans which included $25,000,000 to be spent at the **Hanford Works** near Richland. This is in addition to the previous $80,000,000 program.

★The Bureau of Land Management held a meeting in Spokane, Oct. 17 and 18, at which mining leaders of the Pacific Northwest were invited to talk about land problems arising through location of mining claims. Possible revisions to the Federal Mining Laws were discussed with representative leaders of other industries and Government agents involved. Discussion showed agreement existed on many points including the following:

1. Continue filing mineral claims at county seat with copies going to Federal District Land Office.
2. Adequate description of claims will be made. The cost of providing such a description will count as part of the required discovery and assessment labor.
3. Notice of assessment work will also be filed in duplicate with Federal Land Offices.
4. A bill of particulars as to work done will be required.
5. Claims on which annual labor is not performed may be presumed abandoned at the end of three years. Another mineral claimant can locate as soon as the claim is in default.
6. Suitable language will be sought to provide rights of way across unpatented mining claims not now subject to condemnation.

★**Howe Sound Mining Co.**, operating the Holden Mine in the Cascades, has reported third-quarter production to be: gold, 28,423 oz.; silver, 329,393 oz.; copper, 7,619,115 lb.; lead, 6,343,166 lb.; and zinc, 10,723,926 lb.

★**Spokane-Portland Cement Co.** mined 150 tons of limestone from its quarry at Limerock in Stevens County during the first nine months of 1949. The plant operating at capacity employed 40 men.

★**Permanente Metal Corp.'s Mead** Aluminum Reduction Plant, had to take one of its six pot lines out of production in October, thus laying off more than 130 employees. The reason was the reduction of 27,800 kw. by the Bonneville Power Administration.

## CANADA

★**Labrador Mining and Exploration Co.** is now reported to be controlled 52% by Hollinger, 32% by the public, and 16% by the M. A. Hanna Co. Hollinger controls 60% of the Hollinger North Shore Exploration Co. also in which Hanna holds 40%. Total expenditures for both properties now amount to about $7,000,000.

## ONTARIO

★Nickel mines in the Sudbury district produce about half the total Canadian copper. While output last year reached an all-time record, 15% higher than in 1947, this year the rate has been reduced. Nickel output in 1948 increased 21% above the previous year. At **International Nickel's** Creighton mine the headframe has been completed and surface buildings are under construction. Preparations are being made for mining low-grade ore. At the Frood and Stobie mines open-pit mining of low-grade ore will continue for another two years. Sinking at the Murray mine is being continued to open up ore of better grades that has recently been discovered.

★Next summer **International Nickel** will complete construction of an oxygen plant for use in flash smelting where coal will be replaced as fuel by a mixture of oxygen and pyrrhotite. Flash smelting will increase the output of acids at the plant operated by **Canadian Industries, Ltd.**

★At **Macassa mines**, on the west end of the productive portion of the Kirkland Lake "main break," indications of important new ore have been found in cross cutting on the 4,625-ft. level. Ore is believed to be located in the north wall of the main break, and it may be associated with the "R" vein. Work has been extended to within 200 ft. of the common boundary with Kirkland Lake gold mine, and it will take another two months to test the area. Preparations have been completed for sinking the No. 2 winze below the 4,625-ft. level at a point 1,800 ft. south of the No. 1 winze. Improved earnings this year have enabled Macassa to pay off the debt contracted in bringing its subsidiary Renabie into production.

★**Lake Shore mines** plan to deepen its shaft from 7,613 ft. to 8,000 ft. with the final stage of sinking to be started in January and finished in about a year. Exploration of the block of ground from 6,825 ft. down to 7,325 ft. may represent the most important undertaking in recent years. A crosscut is now being driven on a 6,575-ft. level into the adjoining Kirkland-Hudson Bay property controlled by Lake Shore. The cross-cut will be run 1,300 ft. across that property. Exploratory work north of the old Lake Shore orebody is reported encouraging. The mine continues to hold production at about 1,050 tons daily.

★**Couchenour-Willans** gold mines expected to have the enlarged mill in operation in November. Increasing rated capacity from 300 to 500 tons daily. Plant expansion has cost about $40,000. The Dorr Fluo-solids roaster making possible a 94% recovery, is

adequate for the increased tonnage. Average recovery this year at $13.40 per ton. The mine is developed down to 675 ft., but the two lower levels are not being worked at present. About 75% of the mill feed is being secured about the 375-ft. horizon. The shallow horizons give evidence of substantial ore reserves. The improved labor situation is making it possible to reopen a No. 2 shaft area where substantial tonnages and good grades have been opening up.

## QUEBEC

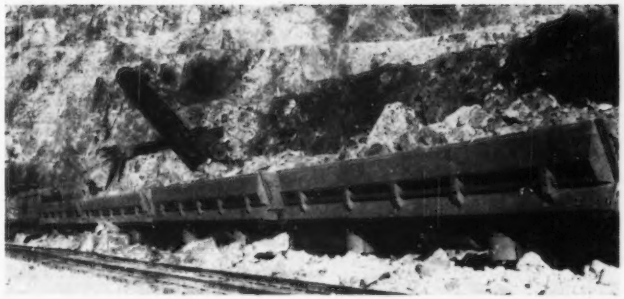
★**East Sullivan mines** report an annual rate of profit of $3,000,000, $10,000,000 gross production. The company is exempted from taxes and write-offs for the next three years as a new producer. The $2,000,000 borrowed from the Noranda mine could be retired in but a short time, althought Noranda holds an option on 200,000 shares of East Sullivan at $4. If this option were exercised it would place the company in a satisfactory position for working capital.

Exploration work has been encouraging. A drill hole 250 ft. below the 650-ft. level intersected two ore veins, each of 70 ft. These averages 1.14% and 6.39% copper, and 0.029 oz. and 0.018 oz. gold per ton.

★**Golden Manitou mines** has been milling slightly better than 1,000 tons daily for the first nine months this year. Although profits are ¼ lower than the same period a year ago due to lower metal prices, costs have been reduced 11c. to $4.30 per ton. Ore reserves have been increased by 125,000 tons, following the discovery of a new structure located 400 ft. west of the previously established limits. Developments on the 1,110-ft. level and at the 1,260-ft. level leaves considerable room for vertical continuity. The ore is higher grade than mine average in both gold and silver, in addition to 375% zinc and 0.5% lead. Shaft sinking has been completed to a depth of 2,030 ft. and three new levels opened to 1,870 ft. In 1950 sinking is to be continued down to 2,490 ft. An $80,000 addition to the mill has been completed, and it is expected to be paid for within a year, as a result of increased efficiency in recovering both silver and zinc.

★**Quemont Mining Corp.** reports the ore grade has been increased an average of $13.50 per ton for gold, copper and silver, including the new 10% premium on gold, although mill-feed continues to be diluted by low-grade development rock stockpiled on the surface. The shaft has been deepened to 2,600 ft. and preparations are being made for exploratory drilling at depths not yet attempted. Ore reserves are largely restricted to horizons above 1,000 ft. where the original drilling took place.

★**Lamaque Gold Mines** has been holding the mill rate at about 1400 tons daily, after starting the year with

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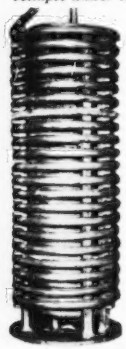

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## Canada *(Continued)*

an average of 1250 tons. Completion of the new 4,000-ton storage bin will make it possible to step up the milling to 1500 tons. Operating costs have been reported at an average of $5.33 per ton before taxes. The main shaft is down to 3,600 ft., but development work has not been attempted below 3,000 ft. Exploratory work is being undertaken from the old No. 5 shaft which is being deepened from 300 to 575 ft. A long cross-cut is being driven on the 1200 ft. level from the main mine workings to test the downward continuity of the West Granodiorite plug.

## MANITOBA

★**Sherritt Gordon Mines, Ltd.** (Lynn Lake), property, reports the first intersection in the "A" ore body below the fault displacement as returning average values in nickel and better than average in copper, over 190 ft. of cross section. Officials have decided to develop the Laurie River power sites, and negotiations are being completed with the Province of Manitoba. This power site is capable of supplying all requirements of mining and milling.

★**Ogama-Rockland Gold Mine, Ltd.,** reports the diamond drilling at **Ogama** section has indicated a new vein with interesting values. It intersects the shaft area near the 1,000-ft. level. Plans are to deepen the present shaft from the 750-ft. level. Production for nine months of 1949 amounted to $445,370,000, an average recovery per ton of $11.97.

## BRITISH COLUMBIA

★At the Cork-Province property in the Slocan area, operated by **Base Metals Mining Corp.,** good operating profit is being realized, on ore from the 4th and 5th levels. Preparations are continuing for increasing operations, including deepening the shaft to develop extension of the high grade lead-zinc-silver ore proven on the 5th level and the new ore located by diamond drilling below the 4th level.

★**Gwillim Lake Gold Mines, Ltd.** has suspended work on the Hot Punch property in the Lake Windermere area. The property, along with the Mineral King and Delphine groups, was taken under option in 1948. Results of work done during the past summer were disappointing and no further exploration is planned on the three.

★Customs ore shipments to **Consolidated Mining & Smelting Co.** of Canada's Trail smelter in the four-week period ending Oct. 22 totaled 10,932 tons, a drop from the 13,448 tons in the previous four-week period. Lead shipments totaled 6,246 tons compared with 9,648 tons previously, and zinc shipments were 4,686 tons, compared with 3,800 in the previous period.

★**B.R.X.** (1835) **Consolidated Mines, Ltd.** is processing with work preparatory to running a series of diamond drill holes fanwise from a station on the 9th or bottom level to investigate the mineralized zone at 200 ft. additional depth.

★Development may be resumed shortly at **Congress Gold Mines, Ltd.'s** Bridge River property as a result of plans for reorganization and refinancing. A proposal to be submitted to shareholders calls for a one for four reorganization and transfer of the property to a new 3,000,000 share company.

★Work on opening **Bralorne Mine** at Bridge River at new depth, following tracing of orebodies for 900 ft. below the present bottom level is progressing satisfactorily, with sinking operations at the Empire shaft now at the 25th level, only one from the objective.

★**Guichon Mine, Ltd.,** has let a contract for 250 ft. of shaft sinking at its Copperado mine in Nicola district, to the Gavelin brothers of **Merritt,** mining and development contractors. Completion of the contract will give a depth of 350 ft.

★Ore bearing the best lead and zinc values yet encountered at the Ainsworth property of **Yale Lead and Zinc Mines, Ltd.,** has been discovered by dewatering of an old winze from the main Highlander tunnel.

★Hedley Nickel Plate, one of B.C.'s top gold mines, operated by **Kelowna Exploration Co., Ltd.,** at Hedley, was closed by a five-day strike. Company wage raise offer of 34 cents per day, originally rejected by the union, was finally accepted with the pay raise retroactive to Sept. 20. Company also granted inclusion of all employees in the "operating bonus," which averages 82 cents a shift. Pay rate for skilled miners at Hedley Nickel Plate was $1.01 an hour.

★**Camac Mine Holdings, Ltd.,** has started work on the **Tofino Gold Mining Co.** property on the west coast of Vancouver Island. Camac recently secured an option on a controlling interest in Tofino.

★Preliminary agreement is reported between representatives of **Hedley Mascot Gold Mines, Ltd.,** and **Silver Giant Mines, Ltd.,** under which the Mascot company may acquire a controlling interest in Silver Giant in return for installing a mill and placing the Giant silver-lead property in Spillimacheen on production.

★**Sheep Creek Gold Mines, Ltd.,** has placed its Paradise mine in the Windermere area on production, with both lead and zinc concentrates being shipped to Trail smelter. In addition, the company's gold mine at Sheep Creek, Salmo area, has resumed milling with return of crew members from the Paradise construction job.

★First unit of the **Reeves MacDonald**

concentrator near Salmo is producing from 550 to 650 tons per day and recovery is entirely up to expectations. The second mill is now being installed and plans call for full production at the silver-lead-zinc property before the end of the year.

## MEXICO

★Optimism over the increased silver exports is being dimmed by the renewed threat of major labor trouble. It would probably start with the demand by the miners and associated workers union for the revision of labor contracts featuring pay raises. This move is similar to that undertaken by the union back in 1946, but seems to have even greater strength at the present time. American mine union chiefs have pledged their Mexican brethren total moral and economic support in their move, even to strike.

★Promising iron deposits have been found at Villa de Alvarez, Colima.

★Ninety percent of Guanajuato's mining problems were solved when Antonio Martinez Baez, secretary of National Economy, authorized the following steps: (1) totally exempting Guanajuato's gold from the production tax; (2) reducing by 80% the output levy on silver; (3) relinquishment of control by the Federal Government of the Guanajuata mill; (4) aiding the association to obtain a 2,500,000 peso ($29,000) bank loan to recondition that plant for more efficient operations.

★National Commission for the Stimulation of the Mining Industry is investigating a rich gold and silver deposit prospectors have reported at Ardillas between El Pedregal and Mogotes.

★Guerrero Federal congressmen have complained to the attorney general that high graders guarded by gunmen are working the mercury mines in that state.

★An amendment to the mining laws gives the Bank of Mexico exclusive authority to export gold. Placer gold producers desiring to export must sell their gold at the prevailing rates to the bank.

★Minister of National Economy Baez has defended the franchise granted to Cia. Explotadora de Istmo (Texas Gulf Sulphur Co.) to work sulphur deposits on the Isthmus Tehuantepec, Vera Cruz. He states that the concession is legal and also advantageous to Mexico because it compels the concessionaire to pay the commission a royalty in the form of 15% of the sulphur mined. He pointed out that Mexican interests which had a concession to work these deposits would have paid only a 4% royalty.

★Small miners in six Mexican states are forming a National Federacion de Asociaciones de Mineros en Pequeño


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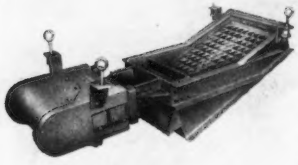

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## Mexico *(Continued)*

whose chief aim is getting adequate financing for mining ventures on a small scale.

## CHILE

★The Export-Import Bank has loaned $2,750,000 to Corporación de Fomento to finance the development of the iron deposit, El Romeral, near Serena. This mine will supply the steel mills being built under the technical supervision of Koppers. The mine itself is the property of **Bethlehem Chilean Iron Mines Co.**, a subsidiary of Bethlehem Steel. The ore body contains some 20,000,000 tons of 60% ore as hematite, and magnetite. It will be mined at the rate of 1,000,000 tons a year, with one-third to be shipped to the Chilean Steel Plant and two-thirds to Sparrows Point, Md. Total investment to equip the property, build the wharf at Guayacan Bay and buy rolling stock, will amount to $6,250,000, of which Bethlehem will put up $3,500,000. The loan for the remainder will be paid back in 15 years, and will earn 4%.

★Because of decreased production at Chuquicamata, Potrerillos, El Teniente, there has been an increase in the number of unemployed by 5,500 since the end of last year.

★Several of the country's local mine associations are organizing a mining congress at La Serena to debate problems relating to the small miner. The mining society of Chile has sponsored this congress to be held at the end of November. The president of the Republic has promised to attend the meeting.

★The **Kelly Geophysical Co.** has completed surveys of the Carrizal Alto and Ojancos Nuevo copper camps. Both spontaneous polarization and the magnetic methods were used. The same company has also done geophysical work for the Punitaqui and Aysen Companies.

★Mine and mill workers at **Cia Minera Disputada de Las Condes** near Santiago are on strike for higher wages. This is called the "legal strike" because all regulations in the labor code were gone through before the men went on strike.

★Because of increased cost **Cia. Salitrera de Trapaca y Antofagasta** has notified the Secretary of Labor that it intends to stop production in the nitrate plants at Humberstone, Pena Chicao, Mapocho, and Santa Laura. This cutdown will throw 4,500 workers out of work. It will be a hard blow to Tarapaca Province whose economy depends on nitrate production.

★Prices of gold coins auctioned at Santiago and Valparaiso stock exchanges exceeded all previous records, reaching 3,700 pesos for pieces containing 18.3 grams. Even if the black market rate of exchange at 100 pesos to the dollar is employed for conversion, an ounce of gold is worth $63. Gold price is even higher in the Argentine.

★According to a recent decree of the Ministry of Economics, medium and small mines from now on will be able to obtain 43 pesos for their dollar instead of 40.60 pesos.

★The Secretary of the Treasury introducing the Chilian budget for 1950 before a committee of senators and deputies announced that the fall in the price of copper, coupled with the decreased production at the copper mines will mean a reduction of $55,000,000 next year.

## PERU

★By a recent decree the government will hand over 100% of the value of any exported mining product in export certificates. This means that the Peruvian miners can obtain about 18.00 soles for the dollar in the free market, instead of 6.5 soles which is the official rate. This measure will help counterbalance the recent decline in metal prices.

★**Cerro de Pasco Copper Corp.** has been increasing its electrolytic copper and lead capacity to such an extent that recently it has exported only electrolytically refined metal. The present zinc plant is too small to allow for full production of electrolytic zinc. Gold is also refined now before it is exported.

## COLOMBIA

★**Placer Development, Ltd.**, reports that in the nine months ended Oct. 1, **Pato Consolidated Gold Dredging, Ltd.**, operating on the Nechi River, handled 12,623,500 cu. yd. for recovering of 96,304 oz. fine gold, valued at $3,370,640. In the two months to Oct. 1, **Aznazu Gold Dredging, Ltd.**, dredged 827,700 cu. yds. for recovering of 3,500 oz. fine gold valued at $122,500. Total recovery for nine months was 17,266 oz. of fine gold.

★E. M. Mallarino has started exploitation of zinc deposits near Junin. Between February and April he exported 200,000 tons of zinc into the United States.

★**Industria Colombiana de Barita, Ltda.**, are exploiting barite in Chiriguana, Magdalena. The output during the second trimester of 1949 amounted to 58 tons which were sold for 92 pesos a ton.

★Two asbestos deposits, Yarumal and Antioquia are being explored. The company, who is interested in exploitation, is negotiating for the necessary capital.

★**Industrias Purace** are exploiting

about 6,000,000 tons of sulphur deposits on the slopes of the Purace volcano in Cauca Department.

★The output of gypsum mined in Roviea, Tolima, yielded 1,510 tons of raw gypsum during the first semester of 1949.

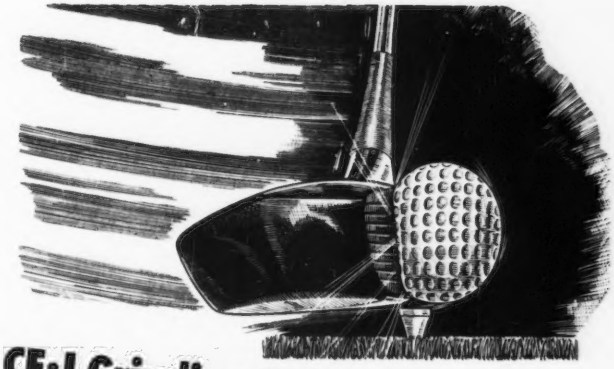
## PHILIPPINES

★At **Benguet-Balatoc** the main Antamok shaft has been open to the 500-ft. level. A cross-cut driven northeast from the main haulage level to connect with the shaft. Old stopes in the Antamok section have been reopened, and new veins cut in the long-haulage tunnels to the central mills are being developed. Benguet is currently producing about 900 tons of ore per day. Rehabilitation of the old mine is 40% completed. At the Balatoc mine the Barr Lode tunnel, main haulage level for the property, has been reopened and the old stopes in the upper level are being brought back into production. Extensive development work is going on where rich, narrow veins were uncovered before the war. The mine is about 60% rehabilitated. The new Desert vein, first cut by the Benguet Consolidated on its 700-ft. level crosscut, is a very strong structure with widths varying from 9 to 15 ft. Values are spotty. At a recent stockholders meeting it was declared that ore reserves now totaled 4,000,000 tons for Benguet and Balatoc with a gross value of nearly $40,000,000 at $35 gold.

★Production at **Atok-Big Wedge** continued steady in September with $189,000 recovered for milling 12,100 tons of ore. The shaft has been completed to the 800-ft. level and the Keystone vein has been mined for over 800 ft. It is reported that development work shows better values on the 800 than on the 700-ft. level. Reopening of the Broadway vein has started. Considerable excitement was caused by reports of rich ore encountered in the extension of Benguet's Desert veins in the Atok property. Investigation disclosed that the Atok crosscut probably cut the Bua vein also encountered in the Benguet. About 180 ft. of additional drifting was needed before cutting the Desert structure. The Bua vein averages 5 to 6 ft. in width with ore at about $15.50 per ton.

★The **Mindinao Mother Lode** made a post-war production record in September with $164,800 recovered from 8,500 tons milled. No. 1 shaft is being sunk below the 700-ft. level. October production was $161,400 from 8,200 tons.

★Slump in the demand for chromite has caused stoppage at the **Masinloc** chromite deposits. Other chromite properties are completing contracts for ore. **Acoje** shipped 6,000 tons in September and has contracts to ship

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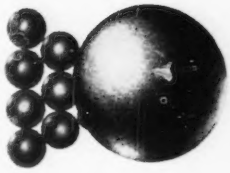

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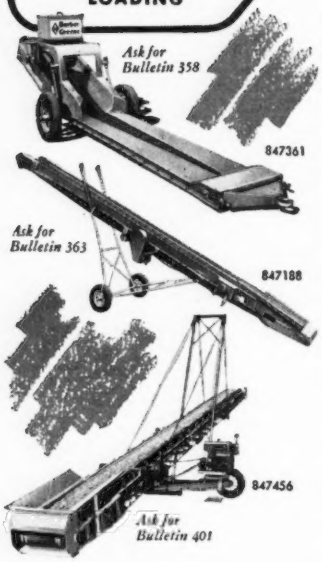


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## Philippines *(Continued)*

4,000 tons per month until May, 1950. Representations have been made at Washington by American and Philippine officials to give Philippine producers priority on Government purchases for the stockpile. **Misamis** Chromite operating in Oriental Misamis, Mindinao, shipped 1,544 tons of high-grade ore in September.

★The price of gold in the open market in Manila has improved slightly after a rapid decline from $52 to $42 per oz. Sales have been made at $44.50. However, demand is not strong and mine operators are uneasy. A premium price is needed above the prewar if producers are to be rehabilitated. Work will be resumed at the Itogon Mine, Baguio, and the Coco Grove dredging project at Paracale.

## AFRICA

★The first portion of the head gear at No. 3 vertical shaft of **Vaal Reefs Exploration and Mining Co., Ltd.**, was about 70% complete. One sinking hoist was ready and the other nearly finished. The shaft itself is 59 ft. below the collar.

Subvertical shaft was started and sunk 21 ft. below the underground hoist chamber level. Excavations for engine rooms, rope braces, shieve wheels were about 70% complete. Good progress was made in cutting the ore passes and other work incidental to shaft sinking.

★**Van Dyk Consolidated Mines, Ltd.** sunk its No. 5 subvertical shaft to 3,591 ft. from the 22-level. About 352 ft. of station cutting and other work was done.

★In the new **Consolidated Gold Fields, Ltd.** group, Robinson Deep which had a quarterly loss of £94,516 sterling because of an underground fire in the quarter ending June 30, returned a working profit of more than £100,000 sterling in the September quarter.

★At **Doornfontein Gold Mining Co., Ltd.**, the Annon shaft reached 2,189 ft. A relay pump and cable station was cut at 1,800 ft. Permanent winding equipment is being erected at No. 1 shaft where sinking operations have been temporarily suspended.

★At the **West Dreifontein**, No. 1 shaft was sunk to a depth of 2,706 ft. The quantity of water encountered in drilling during August and September increased involving long cementation periods for consolidation. At 2,700 ft. an intermediate pumping station was cut and supported. No. 2 shaft was sunk to 3,397 ft. and a station to serve No. 7 level was cut and supported at 3,264 ft. No. 3 shaft was sunk to 717 ft. Cementation drilling revealed a further deterioration in the ground in advance of the shaft bottom. The fissure previously disclosed is apparently an underground cavity necessitating injection of large quantities of sand and cement for consolidation.

Platform hoist and permanent headgear at No. 4 shaft were completed. Sinking was temporarily suspended during the quarter.

★At **Village Main Reef Mine**, 6,523 ft. of old drives and crosscuts were reconditioned. At 338 ft. underground diamond drilling was done.

★At **Rand Leases**, 42,552 cu.ft. were excavated in stripping 11A subvertical shaft to full dimensions.

In deepening of No. 9 shaft, 57 ft were sunk from the 20th level at incomplete dimensions bringing the total footage by raising and winzing from existing levels to 564 ft.

★In the Free State, development continued on the 2nd, 3rd and 4th levels at **St. Helena Gold Mines, Ltd.'s** No. 3 incline shaft. Total development footage was 5,207 ft., and 2,135 ft. of basal reef was sampled. Payable reef was 985 ft. Water bearing fissures retarded development work.

No. 4 vertical shaft reached 2,362 ft. and 112 ft. of station work was done. Sinking is now proceeding at footwall quartzites.

★At **President Brand mine** excavation for the shaft collar foundations was completed to a depth of 41 ft. Shaft sinking was expected to begin in November.

★At **President Steyn mine**, No. 1 shaft was deepened to 808 ft. Work began on the permanent steel headgear. First temporary sinking hoist was completed and a start was made on the second. The sinking of No. 2 shaft started on Aug. 25 and reached 127 ft. on Sept. 30.

★At **Welkom** No. 1 shaft was deepened to 1,687 ft. The intersection of water-bearing fissures interrupted shaft sinking on several occasions. The steel head gear was completed and work started on the first hoist.

No. 2 shaft was sunk to 1,983 ft. and the first underground station cut on the 20th level. Water bearing fissures and faulted ground caused delays.

Excavations and constructional foundations for the reduction plant which were begun during the quarter, progressed satisfactorily.

★**Western Holdings** No. 1 shaft was sunk to 1,546 ft. Sinking was delayed by the fractured condition of the Venterdrosp lavas. No. 2 shaft was deepened 440 ft.

★During the quarter **Middle Witwatersrand** bought surface rights over 1076 morgan in the Virgina area and over a 2/7 share of the farm Van Den Heeversrust 419, northwest of Odendaalsrus.

★**St. Helena Gold Mines Ltd.**, in the Free State installed a reduction plant to treat about 80,000 tons a month. It is expected the plant will start

up about the middle of 1951 at an initial rate of approximately 50,000 tons a month.

★Gold production in the Transvaal in September totaled 995,704 oz. This is a drop from July and August, but well above the average during the first six months of the year.

★Daily-paid employees and mine surface and underground officials have been granted a 15% increase and other benefits through negotiations of their respective unions with the Gold Producers Committee of the Transvaal Chamber of Mines. Native laborers' minimum rates have also been increased. Medical benefits and a savings allowance were consolidated. A contributory pension fund will be established.

## AUSTRALIA

★In a survey of research developments in mining and metallurgy, Professor Dunkin of the University of Melbourne mentions the use of geo-chemical methods in the Wallaroo-Moonta district. Short delay detonators have been tested in a number of Australian mines. A committee has been formed to investigate the non-destructive testing of wire ropes. Professor Dunkin believes that carbide insert bits have a bright future in Australia. For the treatment of Queensland heavy mineral beach sands, a plant now under construction on Stradbroke Island will incorporate Humphreys spirals of Australian manufacture, a Dutch State mine cyclone and magnetic and electrostatic equipment. Another interesting development noted by Professor Dunkin is the attainment of pilot plant stage at Port Pirie (Broken Hill Associated Smelters), in vacuum dezincing and electrolysis of molten lead sulphide in the Halkyn cell.

★The Australian Aluminum Commission now has proved bauxite deposits sufficient to maintain production of aluminum at 10,000 tons a year for 100 years. The Commission admits in its report that rail and sea freights may place Australian bauxite at a disadvantage in comparison with higher grade imported ores.

## NORTHERN TERRITORY

★A widely publicized uranium find in the Harts Range is definitely a washout. Although the samarskite is apparently high grade, it occurred in very small, widely scattered pipes. A reward, however, of £250 sterling will be paid to the share holders in the mica lease who were the first to report the discovery.

## WESTERN AUSTRALIA

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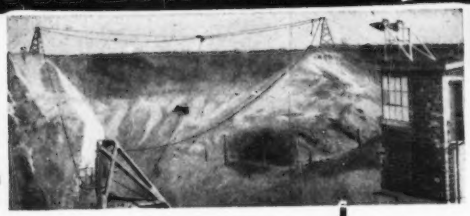

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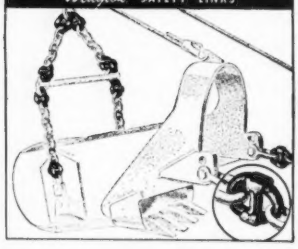

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## Australia *(Continued)*

the nominal capital of £200,000 to work the Blue Spec mine at Nullagine.

★In the quarter ended June 30, gold mines of Kalgoorlie milled 37,835 tons for a return of 9,177 oz. Last year, surface before appropriation amounted to only 8s. a ton from ore valued at 43s. a ton, predevaluation gold price. Today the same ore is worth 62s. per ton, leaving a surplus of 27s. This will be reduced somewhat by rising costs.

★**Norseman Gold Mines** is investigating the possibility of reopening the Norseman Mines. Norseman has been concentrating on pyrite production for the past two years, after crushing grade had fallen to 2¾ dwt. At the new price of gold in terms of Australian currency, even this grade would be worth about 13s. more a ton than before devaluation.

## SOUTH AUSTRALIA

★Iron ore production is picking up after the quarry workers strike which was followed by a coal strike. Shipments from Whyalla increased to 45,615 tons in August and to 167,320 tons in September.

## VICTORIA

★**Deborah Gold Mines** shows a debit balance of £23,944 sterling in developing the account for the year ending July 31. At this date shaft sinking was completed to 2,076 ft., with stations cut at 2,020 ft. and 1,950 ft. Cross-cutting west is progressing at both these levels.

★**Ironback Gold Mining**, Bendigo, is expected to go into voluntary liquidation. Machinery and plant have been sold for £4,000.

★Another Bendigo company, **Hercules Gold Mining**, has obtained a small government advance toward the cost of development at the 310, 410 and 500-ft. horizons.

★The Mines Department has also approved a loan of £3,750 to **Gold Residues, N.L.**, to purchase additional filter units. This is the first government advance made to a company not engaged in actual mining.

## TASMANIA

★**Aberfoyle Tin** treated 25,362 tons of ore in 1948-49. The decrease from the preceding year was due to important development work. The main shaft was sunk to 901 ft. to open new levels at 747 ft. and 867 ft. cross cuts and drives along the ore veins was greater than in 1947 and 1948. Ore reserves of June 30 were estimated at a total of 145,472 tons. During the past business year a heavy media separation testing unit was installed. It demonstrated that a further 2% or more recovery of metal values will be entirely possible.

★**Renison Associated Tin Mines** is installing a new electric hoist at their property.

## NEW SOUTH WALES

★Ore reserves at **Broken Hill South** were estimated at 1,970,000 tons compared with 1,855 tons a year earlier. Net returns for mining in 1948-1949 was £1,163,945. The mill treated 267,028 tons of ore for a recovery of 44,314 tons of lead concentrates, and 55,593 tons of zinc concentrates.

★Accounts of **North Broken Hill** disclosed a profit of £1,712,451. Out of this £750,000 has been appropriated for new plant and mine developments. Ore reserves of June 30 totaled 5,151,000 tons. Ore extracted during the year aggregated 327,205 tons. Lead bonus received by employees averaged £11 a week whereas actual wages only averaged £7/1/5 a week.

★Two new gold mining companies have been registered with a capital of £25,000 each. They are Devon gold N.L., and Devon Prospecting N.L. They will commence operations at Tombaroora.

★**New Occidental Gold Mines** earned a profit of £11,684 for the year ended June 5. Proved and probable ore reserves in the New Occidental mine were estimated to total 435,047 tons, of which 255,047 tons of positive ore averaged 7.29 dwt. of gold. Proved and probable ore reserves in the Chesney Mines were estimated at 270,143 tons of which positive ore totaling 79,143 tons averages 1.2 dwt. gold, and 1.8% copper. Experiments were carried out with detachable drill bits with tungsten-carbide inserts. Work to date indicates that these bits in their present stage of development could be used economically in the softer ore of the Chesney mine, but unlikely to be satisfactory in the hard chert of the new Occidental orebody.

## QUEENSLAND

★The State Industrial Court has refused an application by the Australia Workers' Union for weekend penalty rates and shift work loading for Mount Isa mine employees. It was pointed out that Mount Isa employees received better treatment than workers anywhere in Queensland.

★**Mt. Morgan** earned £198,494 in the year ended June 25. Expenditure for the year on new equipment took up £87,715. Total production for the year was 59,298 oz. of gold, 17,235 oz. of silver, and 3,691 tons of copper. Ore returns were better than in the preceding year.

## NEW GUINEA

★The Commonwealth Government is considering a higher tax impost on gold operations in the territory. Gold production last year totaled nearly 1,000,000 oz.

★Directors of Mandated Alluvials N.L. hope that the company can approve of 1,500,000 tons of payable ore. This would warrant large scale treatment by the flotation process. Results from large samples of ore sent to Canada indicate that the orebody is suited to the process. The Commonwealth is making a geophysical survey of the leases at Port Moresby.

## NEW ZEALAND

★The following information on **Te Aroha** lead field has been made available to McGraw-Hill by Mr. K. A. Beatson. Preparations are in progress to open up Te Aroha. The operations are not expected to get under way before 1951. Te Aroha is located about 80 miles southeast of Auckland and about 30 miles south of Thames. Te Aroha field is on the side of the Te Aroha mountain at about 2,350 ft. The actual exposure is about 50 ft. long. The vein is a complex sulphide occurring at the foot wall contact to a quartz reef. This quartz reef is 8 to 10 ft. wide and can be traced for over half a mile. Old mines with this type ore had to close because of the inability to treat the complex sulphide occurring as a base, and because of the low price of gold at the time. Mr. Beatson recommended diamond drilling in the mountain to test for extensions below the outcrops and old mine workings. At the load existing depth a suitable site for treatment plant would be at an elevation of 1,000 ft. Until recently no work could be undertaken on the area due to opposition from the local Borough Council, because it feared for the borough's water supply which is obtained from the side of the mountain.

## JAPAN

★Production of crude ore has been doubled during a four-month period at the Ani gold mine of **Furukawa Mining Co.** Furukawa is continuing prospecting operations at Innai. Ninety tons of ore there were mined by hand. Mechanical methods are to be installed as quickly as possible.

★The **Mitsui Mining Co.** has been showing a monthly profit by reevaluating stockpiles which contain 2,187 tons of refined lead, 2,144 tons of refined zinc, and 13,600 tons of sintered concentrates (60% zinc). Permission to export zinc is now being sought. Some copper has been shipped and lead is currently under export contract, but producers' stockpiles continue to grow.

★To eliminate excessive production of mixed concentrates at the Daira Lead zinc mines, the **Furukawa Mining Co.** has constructed a new flotation plant which should begin operations soon.

★**Furukawa Mining Co.** is installing


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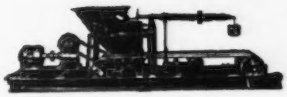

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## Japan *(Continued)*

a new sink and float unit at its Ashio Copper Mine. The unit will be well up in the flowsheet to eliminate excessive amount of rock crushing beyond 1.' in. size. During July the mine produced 30,000 tons of ore, averaging 0.7% copper. The Ashio mills treated 29,826 tons of 0.61% copper ore which yielded 1,112 tons of 13.3% copper concentrates, and 568 tons of handpicked ore averaging 5.8% copper.

Blister copper from all the company's sources amounted to 607 tons, with 254 tons from Ashio ores, 135 tons from custom ores, and 218 tons from copper scrap. The company claims it is losing money on metal mining operations, breaking even on customs smelting, and making a profit on scrap recovery. The Ashio mine currently is producing very low-grade ore and there is a serious doubt as to how long the company can afford to keep it open.

## INDIA

★In September the four mines of the Kolar gold field of Mysore produced a total of 15,377 fine oz. of gold. The Mysore mine lead the field with 4,926 fine oz. production.

★Soaring labor costs were blamed by the **Aluminum Corporation of India, Ltd.**, for its eleventh year without a profit. A 35-ton a year plant was built atop a colliery on the assumption that the cheap India coal would compete with the usual hydroelectric power, but today coal costs 6 or 7 times what it did when original estimates were made. In the factory itself, according to the annual report, labor costs have gone up 60% in the past two years, while production slipped 17%.

## Personal News *(Continued)*

**N. E. McKinnon**, superintendent of the ore haulage department, Utah Copper Division, Kennecott Copper Corp., retired Sept. 1. He had headed the department since its establishment May, 1948, and previously served as general superintendent of the Bingham & Garfield Railway Co. **Lamar S. Hills**, formerly assistant haulage department superintendent, succeeds him.

**David D. Baker** has resigned as manager of tungsten operations of United States Vanadium Corp., and is located in Bishop, Calif.

**Ernest E. Thurlow**, a representative of the Atomic Energy Commission, of Washington, D. C., has established headquarters in the offices of the U. S. Geological Survey at Spokane, Wash.

**H. D. Foreman**, manager of Torbrit Silver mine, Portland Canal district during its development stage, has

been appointed general manager of Yale Lead and Zinc Mines, Ltd., operating in Ainsworth district.

**H. H. "Spud" Huestis** and **Gordon Blaney**, prospectors of British Columbia, have accepted posts in northern Nigeria. They have joined A. O. Nigeria, Ltd., which is associated with Nigeria Amalgamated Tin Mines, Ltd. and Kaffir Tin Co., Ltd.

**Robert Y. Grant**, chief, mining and geology division, Natural Resources Section, GHQ, Supreme Commander for the Allied Powers, has returned to Japan after a visit to the United States to discuss mining, metallurgical, geological and research problems with representatives of the U. S. Bureau of Mines, U. S. Geological Survey, research organizations, mining companies and oil companies.

**George G. Gallagher** has been appointed assistant of the Raw Materials Operations Office of the U. S. Atomic Energy Commission. He succeeds **Jesse C. Johnson**, now deputy manager. Mr. Gallagher was formerly general superintendent of the Compania Minera Venturosa, S. A., Namiquipa, Mexico. During the war he served as an engineer examiner in the mining section of the Reconstruction Finance Corp.

**Vernon L. Mattson**, chief engineer of the Consolidated Feldspar Corp. since 1944, has been appointed director of the Colorado School of Mines Research Foundation. Trustees of the foundation are **W. J. Coulter**, Climax Molybdenum Co.; **J. Paul Harrison** American Smelting & Refining Co.; **Harvey Mathews**, Stearns-Roger Mfg. Co.; **Max W. Bowen**, Golden Cycle Corp.; **Dr. Ben H. Parker**, president of the school; **Prof. C. B. Carpenter**, head of the department of metallurgy, and **Gurnett Steinhauer**, business manager of the Colorado School of Mines.

**William W. Rubey**, staff research geologist of the U. S. Geological Survey, was recently elected president of the Geological Society of America. A graduate of the University of Missouri, he served as an instructor in the geology department at Yale before joining the Survey.

**Dr. Elwood S. Moore**, head of the Department of Geological Sciences, University of Toronto for the past 12 years, retired recently with the title of Professor Emeritus of Geology. A member of the Canadian Institute of Mining & Metallurgy, he served as professor of geology and mineralogy, and later as dean, of the Pennsylvania School of Mines, before joining the faculty of the University of Toronto.

Eleven representatives from the United States attended a three-nation technical conference of the U. S. Atomic Energy Commission on problems of locating, mining and processing radioactive ores, in London, during the last week in September. They were: **Dr. Charles K. Leith**, profes-


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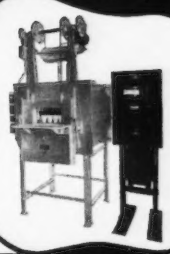

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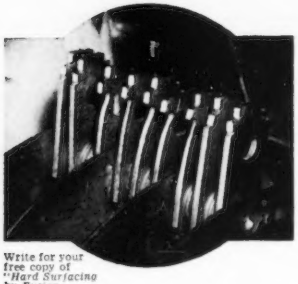

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sor emeritus, geology, University of Wisconsin, and consultant to AEC; **Dr. Arthur P. Butler**, U. S. Geological Survey; **Dr. Glenn Clewett**, Carbide & Carbon Chemical Co.; **Donald L. Everhart**, AEC Raw Materials Operations Office; **Thorold F. Field**, consulting mining engineer, Duluth, Minn.; **Dr. A. M. Gaudin**, professor of metallurgy and director of MIT metallurgical laboratory; **Dr. W. Hirshkind**, Dow Chemical Co.; **Dr. Thomas B. Nolan**, assistant director, U. S. Geological Survey; **Dr. John C. Rabbitt**, U. S. Geological Survey; **Dr. Bertram D. Thomas**, acting director, Battelle Memorial Institute, and **Evan F. Wilson**, AEC Raw Materials Operations Office.

**J. C. McCutcheon** has been appointed manager of Silbak-Premier Mines, Ltd., which is preparing for resumption of operations in Portland Canal district in British Columbia. He was mine superintendent when operations were suspended last July.

## OBITUARIES

**D. G. Brown**, vice president of Humphreys Gold Corp. and general manager in charge of mining operations near Jacksonville and at Trail Ridge, Fla., died Sept. 9. He joined the Humphreys company in 1935 to take charge of gold placer mining operations at Alden Gulch, Virginia City, Mont., and later managed the placer mining activities in California. In 1944, Mr. Brown took charge of the company's production of ilmenite, rutile and zircon near Jacksonville, and supervised the building and operation of the plant at Trail Ridge, Fla., for similar production.

**Otto E. Schiffner**, 69, vice president and general manager of Lava Cap Gold Mining Corp., Nevada City, Cal., died in Grass Valley, Calif., Aug. 26. He was a graduate of the Montana School of Mines.

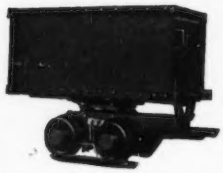
**Frederick William Carrick Whyte**, 86, head of the coal mining operations for Anaconda Copper Mining Co., died Sept. 15.

**Julius Rodman**, pioneer in the development of the Leadville and Creede mining districts, died recently in New York City. A native of Michigan, he came to Leadville in 1880 at the height of the mining boom.

**John C. Rodder**, mining engineer of Oakland, Calif., died Sept. 3 in Oroville, Calif., where he had gone to examine a mining property. For many years he worked in camps along California's Mother Lode and later moved to Nevada, where he engaged in mining in Mineral County. He was 65.

**Donald R. Gustafson**, for many years president and director of Cleary Hill Alaska Mines Co., died recently near Miles City, Mont. He was 67.

AN ACE IN THE HOLE



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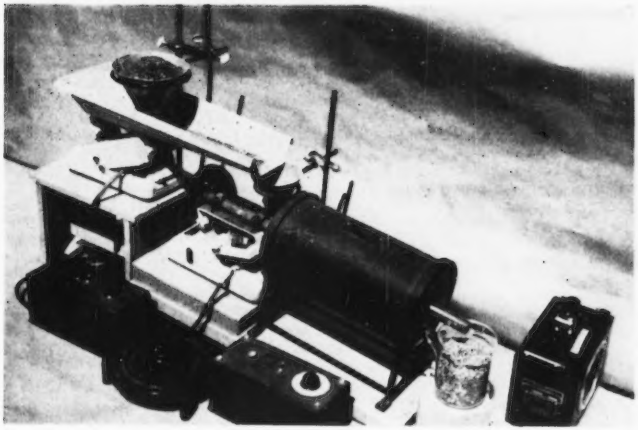


## Laboratory Furnace for Vermiculite and Perlite Tests

The small furnace shown here* has been a useful unit for laboratory expansion of perlite and other volcanic glasses, and the exfoliation of vermiculite at the U. S. Bureau of Mines Southwest Experiment Station, Tucson, Ariz. The unit was designed by J. Bruce Clemmer, chief of the Tucson Branch. The latest model, which includes some modification of the earlier model shown, consists of a 2x48-in., 12-gage, Hastelloy "C" tube passing through a 30-in. Hevi-Duty Type 3724 tube furnace, and supported at both ends by synchronized Syntron Model F.O. vibrator mechanisms. The double support minimized secondary vibrations in the tube and permits expansion tests at temperatures as high as 1,250 deg. C. Automatic control of the temperature is obtained by a platinum thermocouple centered in the tube, connected to a Brown indicating controller in the transformer circuit. Substitution of the present 2-in. tube for a 1-in. tube and other modifications mentioned increased the capacity of the unit to approximately 20 to 30 grams of vermiculite sample per min. Samples are fed to the tube from a small hopper by a vibrating pan feeder.

The unit has been particularly useful for high-temperature expansion tests on volcanic glasses of low-moisture content.

*Based on Bureau of Mines Report of Investigations 4486, and subsequent correspondence with J. Bruce Clemmer, Chief of Tucson Branch.

## Illustrated Safety Cards Teach Bunch-Blasting Method

The illustrated safety card shown here has aided greatly in teaching miners at the Butte mines of the Anaconda Copper Mining Co. to prepare and spit fuses by the bunch-blasting method. Similar cards in Spanish are used at the company's South American operations. In which case Illustration 1 reads, "1. Tájese un pedazo de guiá para usarse como mecha," etc.

Bunch blasting was first developed and applied in the Butte mines in 1931. (See E&MJ, May 1939.) It was developed primarily as a means for spitting fuses when adoption of the electric cap lamp eliminated the carbide lamp formerly used for this purpose. Realizing that bunch blasting made spitting rounds safer and eliminated exposure to black powder smoke from the fuse while spitting large rounds, the methods received a favorable reception on the part of the miners.

In raises where at times up to 100 holes are spit with carbide lamps, the smoke from burning fuses becomes so dense that some holes are missed being spit because of faulty visibility. Multiple spitting by the bunch-blasting procedure shown is so fast that the miner is out of the raise before a large quantity of smoke develops.

It is notable that even in small leases operated by Butte miners bunch blasting is practiced despite the fact that the method requires somewhat more fuse than single spitting. Prior to its adoption there were many accidents attributed by the miners to "running" fuse. Since 1931 there has not been a single accident in the Butte mines due to cap and fuse blasting, although during this period some 3,000,000 holes were spit a year.

# New Books

**MANUAL OF SPECTROSCOPY. By Theodore A. Cutting. Published by Chemical Publishing Co., Inc., 26 Court St., Brooklyn, N. Y. Pp. 220. Price, $6.50.**

This book has been written to assist chemists, mineral collectors, and assayers in analyzing ores, minerals, and alloys. It is particularly useful for those who wish to learn the principles of spectroscopic analysis of minerals. Several types of inexpensive, home-made spectroscopes are described and illustrated so that the reader may learn theory through practice. The text also covers commercial models for advanced and precise determinations. Concluding chapters are devoted to characteristic lines of elements, wave-length tables, and conversion tables.

**DEEP MINING. By Jack Spalding. Published by Mining Publications Ltd., 482 Salisbury House, London E. C. 2, England. Pp. 405. Price, 40s.**

Readers who have read Mr. Spalding's article "Some Observations on Rock Bursts," *E&MJ*, May, 1948, are already familiar with some of his knowledge on deep mining. His text is devoted entirely to problems of deep mines under three main heads: high rock pressure, excessive rock temperature, and great depth. Topics pertaining to high rock pressure include rock pressures in stoping, rock bursts, stope planning, ground control and linings. Other subjects covered are development work, mine fires, ventilation, air conditioning and cooling, dust control, deep hoisting, and a number of graphs useful in solving ventilation problems.

**KAOLIN CLAYS AND THEIR INDUSTRIAL USES. Published by J. M. Huber Corporation. 342 Madison Ave., New York 19, N. Y. Pp. 114. Available to members of industry using clay. Requests should be made on company letterheads.**

This book is unusual in at least two respects. While it must probably be classed as a trade publication it is seldom that such material, particularly in the industrial mineral field, is of high technical quality as this one is. Secondly, the technology of high grade clays is described in detail, except for their ceramic applications.

This publication describes the origin, occurrence, chemical composition and mineralogy of kaolin, particularly of the sedimentary kaolins of Georgia and South Carolina. It covers prospecting, mining, processing, quality control and shipping. Seven chapters are devoted to the use of these clays in all types of rubber, with the desirable physical characteristics and the methods of evaluation for each use. Similarly six chapters cover the use of clays in many types of paper, for both filling and coating. Other chapters discuss uses in adhesives, insecticides, and, very briefly, in ceramics.

The testing of clays for industrial uses is today an exact science compared with the more or less rule-of-thumb testing of a decade ago. General tests which are of importance for most uses as well as special tests for specific uses are described in detail. Equipment needed for each test is listed and methods of making the tests are described.

In the chapters on specific uses, as in rubber, test formulas are given, rubber testing equipment and procedures are described and test results on various clays and other rubber pigments are tabulated. While perhaps other clay producers may advocate alternative testing methods for some properties this book gives procedures which have proven acceptable to the trade, and it forms a very valuable guide to both producers and consumers of industrial clays.

The J. M. Huber Corporation is to be congratulated on this excellent publication.

RAYMOND B. LADOO

**A REVIEW OF IRON-BEARING DEPOSITS IN WASHINGTON, OREGON AND IDAHO. By Carl Zapffe, Manager, Iron Ore Properties, Northern Pacific Railway Co. Report No. 5, Raw Materials Survey, Portland, Ore. Pp. 89, plus 5 plates. Price, $2.50.**

This study, entitled "A Review of the Iron-Bearing Deposits in Washington, Oregon and Idaho," is a summation of investigations of iron ores that Mr. Zapffe began in 1911 while geologist for the Northern Pacific Railway Co., and has continued to the present. The deposits, occurring in 18 localities, are grouped in nine major classes on the basis of their origins. Such grouping has been necessitated by the physical and chemical compositions, produced by uncommon geologic factors. The qualitative factors, giving as they do a clue to the possible use of the ores in industry, have received principal attention. Tonnage has had only secondary consideration.

These ores, according to Mr. Zapffe, are specialty ores and must be dealt with as such. He says, "Nowhere on earth are so many different types in so small an area as in these three Northwest states." A deviation from blast-furnace processes will have to be developed if these ores are to be utilized. Mr. Zapffe advocates adopting as a Northwest pattern only small-scale furnace operations suitable to small deposits. This seems to point to using electric furnaces to reduce the ores to metal, and their qualities point to making specialty iron. Cheap energy has been made available by the hydroelectric plants of the Columbia River system. The present inadequacy of the supply may be retarding commercial developments rather than the character of the ores, in his opinion.

**DETERMINATION OF URANIUM IN ORES BY FIELD ANALYSIS. By F. E. Senftle and C. McMahon, Radioactivity Division, Department of Mines and Resources, Ottawa, Canada. Pp. 11.**

Two rapid methods to determine approximate uranium content of ore samples in the field are described in this pamplet. The first called the "Field Estimate Method" involves the use of a Geiger counter and the comparison of a hard specimen having roughly four sides of known weight with a standard sample. A formula is given to determine percent $U_3O_8$ equivalent. Results may vary as much as 25% from a laboratory assay.

The second method called the "Field Assay Method" requires the use of a Geiger ratemeter, a sample box, sample and standard trays, a mortar and pestle, scale, and screen. A crushed field sample is compared with standard sample according to a carefully specified procedure. Both the deflection and count method can be used to determine approximately $U_3O_8$ equivalent. Greater care is required in the field assay methods. Results for ores containing over 1% $U_3O_8$ equivalent may be determined within 10% of the true value, and within 20% for ores containing 0.1 to 1.0% $U_3O_8$ equivalent.

**ZINC—ITS MINING, MILLING AND SMELTING. A 34-minute sound motion picture sponsored by St. Joseph Lead Co. in cooperation with the U. S. Bureau of Mines. Produced by the Atlas Film Corporation, Oak Park, Ill. Available for distribution to schools, colleges, technical societies, and similar institutions through the Film Library, U. S. B. M., Pittsburgh, Pa.**

The story of zinc is traced from the mining of the ore to the production of slab zinc and other products. Underground shots include tunneling, drilling, mucking, loading and stoping. Surface shots include concentrating and smelting operations. Animated diagrams explain complex milling and metallurgical processes.

Surface shots include concentrating and smelting operations. Animated diagrams explain complex milling and metallurgical processes.

**TITANIUM — IT'S OCCURRENCE, CHEMISTRY, AND TECHNOLOGY. By Jelks Barksdale, Ph.D., Alabama Polytechnic Institute. Published by Ronald Press Co., 15 E. 26th St., New York 10, N. Y. Pp. 591. Price, $10.**

Judging by the lively current interest in all phases of the subject of titanium, it appears that publication of this text, written by a former research chemist of National Lead Co., was timed just right. The greater portion of Dr. Barksdale's text pertains to chemical and metallurgical aspects with considerable emphasis on the properties and uses of titanium metal, compounds, and alloys in industry, also on technical problems involved in the production of these materials. A perusal of the first five chapters of the book covering occurrence and production of titanium ores, indicates that there is an abundance of commercial ilmenite in the world.

A 77-page bibliography increases the usefulness of this text for reference purposes, and indicates a painstaking preparation by the author.

**MINES REGISTER, 1949 ISSUE. Published by Atlas Publishing Co., Inc., 425 W. 25th St., New York 1, N. Y. Pp. 700. Price, $25.**

Information on approximately 5,000 active non-ferrous mining companies in the Western Hemisphere is contained in this volume. The 1949 edition also lists 22,000 inactive mines and their location. Special sections are devoted to: Statistical data for the metal industry; lists of company officials, mining engineers, managers, superintendents, and purchasing agents; mining company securities and the exchanges.

**BERGWERK—UND PROBIERBUCHLEIN. A Sixteenth Century book on mining geology translated by Anneliese Grunhaldt Sisco and a Sixteenth Century work on assaying translated by the same author and Cyril Stanley Smith. Published by the American Institute of Mining and Metallurgical Engineers, 29 West 39 St., New Nork N. Y. Pp. 196. Price, $6.**

These booklets occupy a unique position in the literature of mining and metallurgy because they are the first printed books on any aspect of the two related professions. While these records of miners and metallurgists written about 1520 are not intended to add to current technical knowledge, today's technologists will find much of interest here particularly if they have a normal curiosity about how the real pioneers in mining and metallurgy viewed and approached their problems.

Perhaps the modern geologist will shudder at the confident ease with which the early writers disposed of the whole subject of the origin of metallic ores and the occurrence of ore deposits. But upon reading closely, we find that back in 1520 mine operators learned certain basic principles which some Twentieth Century operators still fail to follow. For instance we read "It is advisable . . . to drive off the main vein every so often to look for other connected orebodies whose outcrop and dip are in favorable directions . . ., since in some mountains very many smaller orebodies occur in various directions near a vein . . ." The fact that numerous present-day operations follow a systematic program of lateral exploration is proof enough that the old timers knew what they were talking about. But this practice is by no means universal, and some companies have learned to their dismay and loss that ore was where "it couldn't be."

**REFRACTORIES HANDBOOK. Published by General Refractories Co., Philadelphia 2, Pa. Pp. 272. Price, $5.**

Smelter operators and metallurgists will appreciate this complete handbook containing accurate and up-to-date information on the little publicized subject of refractories. The handbook is intended to serve those who design, use, purchase, construct and supervise the operation of equipment requiring refractory material.

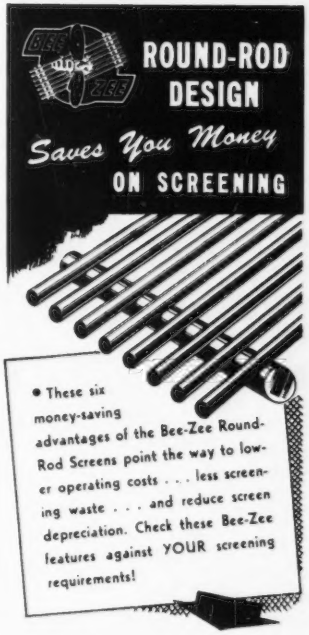
Following preliminary chapters on refractory raw materials and the manufacture of refractories, the volume carries six sections, illustrated in color, covering the use of refractories in the iron and steel industry, nonferrous metals industry, non-metallics industry, glass industry, pulp and paper industry and in steam generators. Another section is devoted to the "Grefco" line of refractories.

Additional sections describe and illustrate standard brick sizes and miscellaneous shapes. The text concludes with construction data, many useful engineering tables and an 18-page glossary of terms.

## Books Received

**Metallurgy for Engineers.** Second Edition. By E. C. Rollanson, Research Manager, Murex Welding Processes, Ltd., previously Senior Lecturer, Department of Metallurgy, University of Birmingham. A condensed descriptive book of ferrous and nonferrous theory and practice for engineering students and welders. For sale by Longmans, Green and Co., Inc., 55 Fifth Ave., New York, N. Y. Pp. 339. Price, $3.

**The Story of Magnesium.** By W. R. Gross. Published by the American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Society for Metals, 7301 Euclid Ave., Cleveland, Ohio. Pp. 339. Price, $3.

**Seismicity of the Earth and Associated Phenomena.** By G. Gutenberg, and C. F. Richter, Seismological Laboratory, California Institute of Technology. Data gathered for more than 50 years is compiled and interpreted in this text on earthquake zones and their relationship to geological and physical features of the earth. Published by Princeton University Press, Princeton, N. J. Pp. 273, including 148 pages of tables recording earthquake shocks, and a list of active volcanoes and their eruptions. Price, $10.

**Internal Structure of Granitic Pegmatitis.** By E. N. Cameron, R. R. Jahns, A. H. McNair, and L. R. Page. Published by Economic Geology Publishing Co., 100 Natural Resources Bldg., Urbana, Ill. Pp. 115, including 70 figures and a map showing principal pegmatite mining districts in U. S. Price, $4.

**Chemical Engineering Plant Design.** New Third Edition. By Frank C. Villbrandt, Head, Department of Chemical Engineering, Virginia Polytechnic Institute. Published by McGraw-Hill Book Co., 330 W. 42nd St., New York 18, N. Y. Pp. 608. Price, $6.

**Tacheometric Tables.** By F. A. Redmond, Professor Civil Engineering, University of Hong Kong. A set of tables giving horizontal and vertical distances for intercepts observed on the stadia rod. Angles range from 0 to 20 deg. by 20-sec. intervals, and distances range from 50 to 850 ft. Published by the Technical Press, Ltd., Gloucester Road, Kingston Hill, Surrey, England. Pp. 256. Price, 12s.

**The Mineral Industry of the British Commonwealth and Foreign Countries.** An unusually good statistical summary of mineral production, imports and exports for the 1941-1947 period. Most foreign countries outside of the British Commonwealth are included in the statistics. For sale by Director of Publications (P2), H. M. Stationery Office, London W. 1, England. Pp. 341. Price, £1, 1s.

**Welding and Cutting Manual.** Tells how to use oxy-acetylene equipment to weld, cut, heat, bend, braze, and solder. Published by Linde Air Products Co., 30 E. 42nd St., New York 17, N. Y. Pp. 208. Price, $1.80.

**Descriptions of Some Ore Deposits and Their Relationships to the Purcell Sills, Boundary County, Idaho.** By Thor H. Kiilsgaard, University of Idaho. Published as Pamplet No. 85 by the Idaho Bureau of Mines and Geology, Moscow, Idaho. Pp. 33.

**Microscopic Studies on Mill Products from the Pine Creek Area, Yreka Mining District, Idaho.** By Lewis S. Prater, Metallurgist, University of Idaho. Published as Pamphlet No. 86 by the Idaho Bureau of Mines and Geology, Moscow, Idaho. Pp. 6.

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## Index to Volume 150

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# Engineering and Mining Journal

## Index to Volume 150

JANUARY TO DECEMBER

1949


**Editorials**

Can labor costs come down?.....June 51
Clear the confusion on stockpiling .....Jan. 51
Don't minimize the CO hazard....Sept. 71
The fight goes on.....Sept. 71
Gold still is a magnet.....Jan. 53
Government—servant or master?..Apr. 67
Handling the subsidy problem.....Nov. 71
The industry is ready.....Aug. 51
Living with lower prices.....May 67
Metal costs and competition.....Nov. 71
Mine subsidy legislation—an editorial .....Oct. 99
Mining looks to the future.....July 83
Mining's greatest need.....Mar. 51
The problem of the cost of mining .....Oct. 71
The risks of mining.....Jan. 52
Strike a blow for free enterprise..Dec. 63
Telling young men about mining..Jan. 52

## A

Abbott .....May n138
Aberfoyle Tin .....Jan. n129; Feb. n174; July n200; Aug. n128; Nov. n153; Dec. n134
Abrasives:
Demand for abrasives, D. G. Runner .....Feb. 93
Acacia .....Sept. n122
Ace Gold .....Oct. n126
Acoje .....Mar. n132; Apr. n157; May n152
Aerofall Mills:
Crushing-grinding unit .....Apr. *112
A-1 Consolidated .....Mar. n134; Apr. n154
Admiral Cons. .....May n136; July n177
Advance .....Nov. n142
Africa:
Tsumeb Corp., Ltd., now operating a reopened lead-zinc property....July *150
Agglomerating:
Rotary-kiln nodulizing is simple, costs less, H. Berg .....Aug. *56
Ainsmore Consolidated .....Oct. n139
Airborne magnetic survey in Maine, P. M. Hurley .....Aug. *52
Ajax .....Apr. n124
Ajax Consolidated .....Nov. n129
ALA .....Nov. n129
Alaska Juneau .....Apr. n136; Nov. n127
Alaska Pacific Consolidated Gold...Nov. n127
Albea York .....Oct. n123
Alco Lead .....July n170; Nov. n136
Alcoa .....Feb. n150; Apr. n135; July n170, 177; Oct. n130
Alder Gold-Copper .....Nov. n142
Alejandria .....Sept. n144
Algeria:
Zellidja—study in cooperation in production of lead and zinc.....July *148
Algoma Ore Properties...Feb. n159; July n180
Alice .....Oct. n140
Allard Lake:
Titanium area .....July *121
Alluvial Gold .....July n188; Oct. n146
Alpine .....Feb. n165
Alps .....Aug. n116
Alps Mining & Milling.....July n175
Aluminum:
Production and uses of aluminum, 1948 .....Feb. 83
Aluminum Co. .....Jan. n110; Mar. n116; Aug. n108
MMSW local loses bargain rights..Feb. 123
Production of aluminum.....Feb. 116
Aluminum Co. of Canada negotiates with British Columbia government....Sept. 102
Amazon .....Aug. n120
Ambassador .....Oct. n129
American Chrome & Magnesium Industries .....May n137
American Cyanamid:
Mining titanium .....July *123
American Gilsonite .....Feb. n149; July n166
American Institute of Mining & Metallurgical Engineers:
Engineers meeting .....Dec. *93
Minnesota Section meets .....Feb. 122
San Francisco meeting.....Mar. *88
American Lead, Zinc & Smelting....Oct. n133
American Mining Congress:
Western Div. meets in Spokane...Nov. 111
American Rutile:
Mining titanium .....July 122
American Silver .....Aug. n112
American Smelting & Refining.....Mar. n118, 120; May n132; Aug. n113, 118; Sept. 122; Oct. n133; Nov. n129; Dec. n122, 124
Buchans finds new orebody.....July *153
Celebrates fifty years in the metal industry .....May *105
Continuous casting process.....July *145
Flotation plant .....July 118
Fuming plant treats 12% slag....July *115
Improvement and expansion of smelters .....July *143
Selby plant makes liquid $SO^2$ from waste smelter gases.....July *138
Sinking bucket operates with hinged guide-shoes .....Feb. *128
Sulphuric acid production to be expanded .....Feb. 114
Tallest stack planned.....Oct. 108
Waste-heat boilers equipped with modern soot blowers.....May *108
American Vermiculite .....Aug. n118
American Zinc .....Jan. n116
American Zinc closes smelter after ten-month strike .....Aug. 92
American Zinc Institute meeting....May *104
Anacon Lead .....July n128
Anaconda Copper .....Feb. n151; Apr. n124; May n136; July n174; Aug. 109, 110, 112; Sept. 122; Dec. n114
Illuminated safety cards teach bunch-blasting method .....Dec. *139
Building a Greater Butte.....July *100
Mechanized drifting speeds development work, J. B. Huttl.....Jan. 67
Self-illuminated backsight aids mine surveyors, W. J. Waylett.....June *65
Western phosphate output soars...July *130
Anaconda Reduction Works produces ferro-manganese .....Apr. 105
Andes Copper .....June n132; Sept. n143
Antimony:
Calculating charges for the precipitation method of antimony smelting, Dr. Chung Yu Wang.....Mar. 67
Consumption and production in 1948, S. A. Gustavson.....Feb. 87
Yellow Pine smelter to produce most of U. S. antimony.....July *140
Antlers .....July n167
Apache .....Oct. n130
Arahura Gold Dredging.....Apr. n154
Arctic Tin .....Jan. n119
Ardlethan Tin Residues.....Aug n128
Argentina:
Aguilar participates in new projects .....July *147
Argonaut .....Apr. n128
Argus Hill .....June n136
Argus Hill Chewton Gold.....Jan. n129
Ariston Gold .....Apr. n148
Arizona:
Value of mining properties.....Sept. 120
Arizona Corp. Commission.....Feb. n142
Arrington .....Oct. n123
Arsenic:
Production in 1948, S. A. Gustavson .....Feb. 87
Ascot Metals .....Oct. n136
Asnazu Gold Dredging .....Apr. n146
Aspen .....May n129; July n169
Associated Lead & Zinc.....Feb. n148
Associated Metals .....Dec. n114
Athletic:
Concentrator increases capacity...July 118
Atkinson Dredging .....Oct. n141
Atlas .....Sept. n123
Atok-Big Wedge .....Jan. n127; Mar. n132; May n152; June n137; Oct. n147; Nov. n151; Dec. n131
Atomic Energy Commission:
Pumice deposits to be located in New Mexico .....Feb. n141
Atomic Research:
Gadget may replace Geiger counter .....Oct. 104
Aunor Gold .....Apr. n138
Plate-bending rolls for mine shops .....May *110
Australia:
Gold production in 1948.....Sept. n146
Tin dredge production.....May 150
Australian Development .....Oct. n145
Australian Iron & Steel.....July n197
Australian Titan .....July n202
Aysen .....Aug n134; Sept. 144; Oct. n143

## B

B.R.X. Consolidated ....Aug. n124; Dec. n128
Bagdad .....Aug. n117; Sept. n128
Bagdad Copper .....Jan. n114
Baker Dredging .....Apr. n130; July n178
Barite:
Demand in 1948.....Feb. 94
New barite possibilities revealed in the Carolinas, E. C. Van Horn.....Jan. *76
Barnat .....Sept. n138
Barnett .....Jan. n116
Barton:
Shift to new separator cuts garnet milling costs, Vogel & Bitzer.....Aug. *62
Basal Reef .....June n132
Base Metals .....Jan. n123; Feb. n143; Mar. n123; May n143; July n186; Aug. n122; Oct. n138; Dec. n123
Basic Refractories .....Oct. n129
Bauxite:
Gold Coast survey may aid mines .....Sept. 102
Bayard Unit .....July n162
Bayonne Consolidated Gold .....Aug. n128
Belden Amador .....Dec. n114


e editorial; n news; c comment and criticism; * illustrated

**Belgo-Mineira:**
Sintering to raise iron ore output..June *59
Belleterre Quebec .....Oct. n137
Bellevue-Hudson .....May n130
Benguet-Balatoc:
.....Jan. n127; Apr. n151; May n152; June n137; July n202; Nov. n150; Dec. n131
Benguet-Balatoc Central Mill ....Mar. n132
Benguet Consolidated .....Sept. n144
Benson:
Soft rubber chute bottom prevents hangups .....Apr. *114
Berry, C. J. .....Jan. n119
Beryllium:
Consumption in 1948 S. A. Gustavson .....Feb. 86
Best .....Feb. n146
Bethlehem .....July n189
Bethlehem Chile Iron .....
.....May n146; Oct. n144; Dec. n130
Bethlehem Iron .....Mar. n126
Bethlehem Steel:
El Pao district, Venezuela, supplies iron ore to Bethlehem Steel ....Aug. *70
Venezuela's iron ore coming soon...July *90
Big Creek Apex .....Nov. n131
Big Bell .....Nov. n153
Big Dome .....Oct. n134; Nov. n142
Binocular .....July n189
Biolamac .....Jan. n123
Bisma*k .....Sept. n123
Bismuth:
Production of bismuth in 1948. S. A. Gustavson .....Feb. 87
Black Diablo .....Aug. n117

**Blasting:**
Air driven fuse reel .....Mar. *107
Changing practice favors reduction of breaking cost. A. H. Hubbell...Nov. 88
Cost cutting at Star mine helped by many factors. R. E. Neyman ..Nov. *90
Illuminated safety cards teach buncher-blasting method .....Dec. *138
Mining industry watches drilling outcome. A. H. Hubbell .....pt. I, Feb. *96
Labor saving, lower costs are prime objectives .....pt. 2, Mar. *68
Shaped-charge tests taper off ...Oct. 97
Blue Eyes .....Apr. n128
Blue & Marble .....Apr. n135; Aug. n115
Blue Ridge Minerals & Mining .....
.....Sept. n130; Dec. n122
Blyvooruitzicht .....July n193
Bonanza June n114; July n167; Aug. n113, 120
Bonanza Copper ..... Feb. n142; May n132
Bonne Terre .....Apr. n136
Boulder Perseverance .....June n136
Bowen Construction .....Oct. n122
Braden Copper ..... Sept. n143; Nov. n149
Bradley .....Oct. n126
Yellow Pine smelter to produce most of U. S. antimony .....July *140
Bralorne .....
May n141; June n128; Aug. n123; Dec. n128
Modern mine dry. Swanston Gibson .....Sept. *88
Brassert, H. & Co. .....July n198
Bratcher .....Sept. n130; Nov. n139
Brazil:
Exports of iron ore .....Jan. n125
Getting at Itabira's iron. L. J. Hughlett .....Oct. *76
Sintering to raise iron ore output..June *59
Britannia Mining & Smelting .....
.....Jan. n124; May n143
Brockton-Nevada .....July n178; Aug. n118
Broken Hill .....Sept. n147
Broken Hill Associated Smelters ..Oct. n145
Port Pirie smelter .....Apr. *82
Broken Hill Mining & Milling ....June n118
Broken Hill Pty. .....
Jan. n130; May n152; Aug. n129; Oct. n146
Broken Hill South ....Mar. n135; Dec. n135
Brooklyn-Stemwinder Gold .....
.....Jan. n122; July n185
Broulan Porcupine .....July n180
Buchans:
New orebody discovered .....July *153
Buckingham .....Nov. n138
Buffalo .....June n121
Buffalo Gold Dredging .....Aug. n118
Building Materials:
Demand in 1948. D. G. Runner ....Feb. 94
Bullion Monarch .....Nov. n140
Bulolo Gold Dredging .....
.....Apr. n154; June n137; Sept. n148
Bulfontein .....Aug. n120
Bunker Hill & Sullivan..Mar. n114; Apr. n131; May n134; July n179; Aug n111; Nov. n132
Block-caving project to recover low-grade ore .....July *110
Mine, mill and smelter modernized. J. B. Haffner .....July *109
New mucker speeds incline sinking .....Aug. *69
Bureau of Land Management meets Dec. n126
Butler Brothers .....
Jan. n117; Feb. n152; June n110; Aug. n114


## C


Cadmium:
Output in 1948. R. H. Mote .....Feb. 89
Cafe de Credito Minero ..Jan. n126; Oct. n143
Calaveras Central .....Sept. n121
Caledonia .....Feb. n144; Mar. n117
Caledonia Silver-Lead..Mar. n114; Sept. n128
Calera .....July n179
Will produce cobalt .....June 89
California .....Apr. n124
California Silver .....May n138; July n165
Callahan Consolidated ..Aug. n112; Sept. n123
Callahan Zinc-Lead .....
Mar. n119; Apr. n124; June n114; Aug. n110
Callinan Flin-Flon .....Apr. n140; Nov. n146
Calumet & Hecla .....
.....Feb. n155; Mar. n110; May n127; June n112; July n174; Aug. n116; Sept. n126
Where new ideas made mines. Lyons, Heyl & Agnew .....July *106
Calumet & Hecla Consolidated Copper .....
Apr. n132; Oct. n128; Nov. n136; Dec. n120
Calveras Central Gold .....Jan. n110
Camac .....Dec. n128
Campbell Red Lake .....July n180
Camray .....Nov. n145
Canada:
The bush and I. J. S. Carman ...June *76
Future brightens as producer of iron ore. J. B. DeMille .....Apr. *90
Labrador iron ore can compete with the Mesabi District .....July *88
Canadian Collieries ....Apr. n141; July n185
Canadian Exploration...Jan. n122, 124; May n144; July n186; Aug. n124; Sept. n140
Canadian Institute of Mining & Metallurgy. Montreal meeting .....June 88
Canadian Johns Manville .....
.....Apr. n139; Oct. n137
Canadian Malartic Gold .....Apr. n139
Canam .....Oct. n139; Nov. n147
Cananea Consolidated .....Oct. n142
Captain's Flat .....Mar. n134; Apr. n154
Carbon dioxide, liquid:
Selby plant makes liquid $SO_2$ from waste smelter gases .....July *138
Carbonate .....Aug. n116; Sept. n128
Cariboo Gold Quartz .....
.....Jan. n123; Apr. n142; July n186
Carlton .....June n114; July n167
Carnegie .....Dec. n146
Carrizal Alto .....Oct. n143
Castle .....Feb. n151
Castle Dome .....Aug. n109
Castle Dome Copper .....Jan. n113
Exploitation of the orebody .....July 95
Central Eureka .....
.....Apr. n128; June n 121; July n165; Aug. n110; Sept. n121; Oct. n121; Nov. n129
Central Manitoba .....Jan. n121; Feb. n162
Central Mining & Investment .....May n149
Central Norseman Gold .....
.....Feb. n174; June n136; Nov. n154
Central Patricia Gold .....July n180
Centralia Victoria Dredging .....June n136
Ceramcis and Refractories:
Demands in 1948. D. G. Runner ..Feb. 94
Cerro Negro .....Aug. n134
Cerro de Pasco Copper .....Dec. n130
Innovations mark new producing units .....July *146b
Mining method changes give improved results .....Apr. *92
Chalcahuil .....Aug. n117
Chamberlin Management Aug. n126; Oct. n138
Champion .....
Feb. n145, 150; Mar. n111; May n127; July n173; Oct. n122, 127, 130; Nov. n130
Charleson Iron Mining Co.:
Lean-ore plant to treat old stockpile R. W. Keehn .....Apr. *80
Charleston Hill .....Aug. n117
Charleston Iron .....Aug. n113
Chemical Lime .....Mar. n116
Chesney .....Aug. n128
Chewton .....June n136
Chief Consolidated .....
May n131; Aug. n120; Oct. n133; Dec. n124
Chile:
Chuquicamata begins building plant to treat sulphide ore .....July *146a
Improved handling cuts nitrate industry's costs. Fernando Benitez ..Oct. *80
Chile Copper:
New smelter proposed .....Feb. 112
Chile Exploration .....Sept. n143; Nov. n149
Chuquicamata begins building plant to treat sulphide ore .....July *146a
Chino .....May n132; July n160; Aug. n118
Chipeta Tunnel .....Sept. n122
Chromite:
Production in 1948. N. B. Melcher..Feb. 91
Chromium Mining & Smelting .....
.....Jan. n111; Mar. n116; May n136; July n177; Aug. n120; Sept. n133
Cia Acero del Pacifico .....June n121
Cia Exploradora del Istmo .....
.....Nov. n149; Dec. n129
Cia Fundidora de Fierro y Acero de Monterrey .....June n130
Cia Minera Aguilar:
Two new projects .....July *147
Cia Minera Los Amicos .....Jan. n127
Cia Minera Bellavista .....May n147
Cia Minera Disputada de Las Condes...
.....Apr. n146; Dec. 130
Cia Minera y Exploradora de Guanajuato .....June n129
Cia Minera Paxtitlan .....Apr. n145
C & K Fluorspar.....Apr. n135; July n172
Cia Delirio de Punitaqui .....Oct. n144
Cia Minera Aysen .....Nov. n149
Cia Minera Nacional .....Nov. n148
Cia Minera de Oruro.....Oct. n142
Cia Minera Punitaqui .....
..... Sept. n144; Oct. n144; Nov. n149
Cia Minera de Real del Monte y Pachuca .....Nov. n148
Cia Salistrera de Trapaca y Antofagasta .....Dec. n130
Cia Valle do Rio Doce:
Getting at Itabira's iron. L. J. Hughlett .....Oct. *76
Clarke & Connor.....Oct. n123
Classification:
Classifier design changed .....Oct. *114
Regrinding copper flotation concentrate with classifier at Magma. F. T. Davis .....Oct. *85
Clayton .....Nov. n133
Clayton Silver .....
Feb. n150; May n134; Sept. n124; Dec. n118
Clear Creek-Gilpin .....Jan. n112
Cleary Hill .....July n188
Cleveland Cliffs Iron .....Feb. n155; Mar. n112; Apr. n134; May n126; Aug. n115; Sept. n126; Oct. n127; Nov. n135
Combats rising costs. A. H. Hubbell .....Nov. 96
Fragmentation with carbide bits..May 80
Climax Molybdenum ....Mar. n119; Sept. n121
Air driven from reel .....Mar. *107
Safety program can also curb costs. W. E. Jones .....Nov. *86
Coal:
Making resin from coal. Ernest Klepetko .....Jan. *81
Coast Iron .....
Feb. n164; Apr. n141; June n128; July n186
Cobalt:
Consumption in 1948. H. W. Favis..Feb. 88
Cochenour Willans Gold Sept. n134; Dec. n126
Better housing, lower costs.....Nov. 95
Cochiti Pumice .....Sept. n129
Coco Grove .....June n204
Coeur d'Alene ....Jan. n112, May n134; Aug. n112; Nov. n131, 133, Dec. n116
Coeur d'Alene Extension .....Apr. n132
Coghlan-Hogan Gold .....Sept. n128
Colorado Mining Association meeting Mar. *99
Colorado Plateau:
Uranium mining .....Sept. *104
Columbia .....Mar. n111; June n110
Columbia Gypsum Products .....
.....July n176; Aug. n120
Columbia Iron .....Dec. n124
Columbia Metals .....Nov. n146
Columbia Tungsten .....Oct. n134
Columbus-Texall Consolidated .....June n116
Combined Metals Reduction Co.:
Making resin from coal. Ernest Klepetko .....Jan. *81
Operator bears down on costs ....Nov. 95
Unloading frozen ore cars at Combined Metals. M. J. Kennard.....Aug. *59
Compania Minera Atacalba .....Jan. n192
Compania Minera del Carmen .....June n130
Compania Minera y Comercial Salt Hoshchild .....Oct. n144
Compania Minera Gustemalateca ....Jan. n125
Compania de Minerales Nacionales. Jan. n125
Compania Minera Tarica .....Sept. n144

**Compressed Air:**
Alarm warns of low air pressure..June *98
Compressed-air unit for back-filling stopes .....Oct. *101
New products for compressed air service .....May *114
Petcock drain for air lines.....May *108
Comstock Extension .....Mar. n120

**Concentration:**
Analyzer aids electrostatic research. Shiou-Chuan Sun .....May *90
Charleson Iron Mining Co. to treat old stockpile. R. W. Keehn.....Apr. *80
Froth flotation of feldspar in North Carolina .....July *125
General advance marks all fields in milling. R. H. Ramsey.....Feb. *106
How you can predict product screen analyses. E. J. Kinney .....June *80
Infra-red heater lowers concentrate drying costs. J. T. Hanvey Jr...Sept. *82
Making resin from coal. Ernest Klepetko .....Jan. *81
Shift to new separator cuts garnet milling costs. Vogel & Blizer...Aug. *62
Sidney mine steps up from small to major producer .....July *127
Sullivan improves mine with float plant for pre-concentration .....July *152
Congress Gold .....Dec. n128
Consolidated .....
..... Jan. n128; Mar. n132; Apr. n152; June n138; Aug. n108; Sept. n144; Nov. n151
Consolidated Astoria .....
.....May n144; Aug. n126; Oct. n141
Consolidated Corp. .....Jan. n112
Consolidated Coppermines..June 118; Aug. n117
Mine power through 44,000-v gas-filled cable. Clark & Hanson.....Aug. *66
Consolidated Duquesne .....Apr. n139
Consolidated Gold Fields .....Dec. n132
Consolidated Mining & Smelting .....
Jan. n122, 124; Feb. n163; Mar. n124; Apr. n141; May n142; June n128; Aug. n121, 125; Sept. n138, 141; Oct. n138, 139, 141; Nov. n141, 143; Dec. n128
Design for increased savings.....July *152
Streamlined smelter .....July *139
Consolidated Speculator..Mar. n115; July n176
Consolidated Zinc .....May n105
Constant Minerals Separation Process. .....Apr. n129; July n162
Continental Machines .....Feb. n152
Conwest Exploration .....Sept. n140
Cooking at 14,000 feet. Remer Strong... .....Aug. *66

Cooperative Mines ..... Feb. n141; July n162
**Copper:**
American Smelting & Refining Co.'s western smelters .....July *143
American Smelting & Refining Co.'s continuous casting process ....July *145
Buchans finds new orebody .....July *153
Building a Greater Butte .....July *100
Cerro de Pasco's new producing units show innovations .....July *146b
Chuquicamata begins building plant to treat sulphide ore .....July *146a
Effect of general deflation on costs 1929 (table) .....Nov. 77
How the costs of producing copper has climbed. Plato Malozemoff (table). .....Nov. 72
How to handle big masses of native copper in Lake Superior region. June 64
Impoverishment of ores. 1910-1947 (table) .....Nov. 75
Inspiration's new open pit operations. P. D. I. Honeyman .....July *95
Inverting standard furnace increases smelter profits .....June *70
Kennecott builds modern refinery. July *97
Phelps Dodge projects assure copper for tomorrow .....July *98
Prices of lead, zinc, copper, tin..... 1929-38 (table) .....Nov. 73
Production of copper in 1944-1948 (table). H. H. Wanders ....Feb 75
Productivity in different classes of U. S. Copper mines 1917-1948 (table). .....Nov. 76
Productivity in U. S. Copper mines (chart) .....Nov. 73
The real danger of high costs. Plato Malozemoff .....Nov. *72
Regrinding copper flotation concentrate with classifier at Magma. F. T. Davis .....Oct. *85
Relative importance of production of different classes of copper mines 1917-1948 (table) .....Nov. 76
San Manuel—our most promising copper area. W. P. Goss ..... July *92
U. S. primary and secondary copper and lead production (chart) .....Nov 74
Copper Age .....Jan. n113
Copper Butte .....Jan. n114
Copper Canyon .....Apr. n130; July n162
Selecting a stoping method to meet high labor cost .....Nov. 95
Copper Mountain .....Mar. n120
Copper Range .....
.....June n112; Aug. n116; Sept. n127
Copper World .....Jan. n113
Cork Province .....June n128; Oct. n138
Coronado Copper & Zinc .....Feb. n146
Flotation plant increases capacity. July 118
Corporacion de Fomento .....June n126
Corporacion Minera Castrovirreyna. July n192
Coulee Lead & Zinc .....May n140
Crater .....Sept. n132
Cresson .....Apr. n124; May n129
Cresson Consolidated Gold .....Mar. n119
Cripple Creek .....Aug. n111; Dec. n115
Cripple Creek Mining & Milling....Dec. n116
Crittenden County .....Nov. n126
Cronor Pershing .....Oct. n136
Crown .....July n194

**Crushing and Grinding:**
General advance marks all fields in milling. R. H. Ramsey .....Feb. *106
Crushing plant design. L. M. Andersen, pt. 1, .... Oct. *34; pt. 2, Dec. *85
How you can predict product screen analyses. E. J. Lovers .....June *80
Rating grinding efficiencies. Legsdin & Schenck .....Apr. *88
Regrinding copper flotation concentrate with classifier at Magma. F. T. Davis .....Oct. *85
Sullivan improves mine with underground coarse crushing system. July *152
Ten ways to cut your grinding costs .....Nov. 106
Unit is capable of reducing run-of-mine feed to fine grind in single operation .....Apr. *112
Crystal Fluorspar .....July n171
Cuba:
Potential tungsten mines. P. A. Bundy .....Aug. *78
Cullum Fluorspar .....Apr. n135
Current Creek .....Jan. n110
Cuthbert's Misima Goldmine .....Nov. n134
Cuyuna Ore .....

## D

Daggafontein .....June n134
Dant & Russell .....July n178
Darwin .....July n165
David .....Oct. n127
Davis-Geneva-Royal .....Aug. n115
Day ...Aug. n112; Oct. n124, 126; Dec. n116
Daylesford .....Aug. n127
Dayton Cons. .....May n133
De Beers Cons. .....Apr. n147; Aug. n130
Deborah Gold .....Dec. n134
Deep Creek .....June n120
Deertrail .....Aug. n120
Delhi Fluorspar .....Nov. n126
Delnite .....Feb. n159
Devon Gold .....Dec. n135
Diamonds:
Changes in the diamond industry July n196
Diatomite:
Mining and processing of diatomite in California. J. B. Huttl. .....Aug. *75
Dickenson Red Lake .....July n180
Dixon, N. T. Chemical .....Dec. n122
Dominican Republic:
Gold export controlled .....Oct. 108
Dominion .....Aug. n113
Dominion Magnesium .....June n124
Production resumed .....Feb. 116
Dominion Silver-Lead .....June n120
Donalda ..... May n140; Oct. n136
Doorfontein .....Apr. n145; June n134; Sept. n150; Oct. n148; Dec. n122
Dorleska .....Aug. n110
Dos Carlos .....Sept. n142; Nov. n148
Dredging see Mining
Drew .....June n112
**Drilling, Blast Hole:**
Carbide bits made in Holland ....Aug. *94
Carbide-tipped forged steel used at mines in California .....Aug. 80
Changing practice favors reduction of breaking cost. A. R. Hubbell. ..Nov. 88
Cleveland-Cliffs combats rising costs. A. H. Hubbell .....Nov. *96
Costs cut with carbide bits at Idaho mine .....Mar. 67
Cost cutting at Star mine helped by many factors. R. W. Neyman..Nov. *90
Economy in churn drilling .....Sept. 96
Four-machine jumbo for large drifts .....Mar. *108
Fragmentation with carbide bits ..May 80
Labor saving, lower costs are prime objectives, pt. 2 .....Mar. *68
Ladder-mounted stopers simplify drilling. B. Leopold .....June *94
Jumbo combined with mucker....Aug. 80
Lightweight rock drill uses external water feed, Germany .....Aug. *94
Mining industry watches drilling outcome. A. H. Hubbell, pt. 1 ....Feb. *96
More about carbide-tipped forged steel .....Dec. 88
Portable drill wagon .....Sept. *110
Rock drill trims churn-drill bits. Dec. *94
Single-use detachable bit .....Sept. 96
Some underground changes at the Holden mine. J. B. Huttl. .....Apr. *84
Tungsten-carbide drilling vs. diamond drilling .....Oct. 97
**Drilling, Exploration:**
Carbide-tipped steel in jack-leg plungers tried in Canada.....Aug. 80
Duluth drilling symposium attracts large crowd .....May 106
Making observations in boreholes. Jan. 78
Dulama Gold .....Apr. n138
du Pont de Nemours:
Active in the field of titanium...July 128
Dust Control:
Internal air jets clean pulverizer safely .....Sept. *108
Dutoitspan .....Aug. n130
Duval Gulf Sulphur .....Dec. n121

## E

Eagle ..... Mar. n119; July n169
Eagle Mountain .....
.....July n165; Aug. n120; Dec. n125
New source of iron ore for Fontana. J. B. Huttl. .....May *92
Eagle Mountain Iron.....Jan. n110
Eagle-Picher .....Jan. n116
Concentrator increases capacity...July 118
Safety device protects thickeners. Sept. *110
Where new ideas made mines. Lyons, Heyl & Agnew .....July *106
Eagle-Picher Mining & Smelting ...Apr. n136
East Eagle...Feb. n150; July n177; Oct. n131
East Malartic .....Jan. n120
East Monarch .....Aug. n122
East R and Pty. .....July n194
East Sullivan .....July n180; Dec. n127
Gold producer starts right with low costs .....Nov. 95
East Utah .....May n132
Economic Cooperative Administration:
Domestic mining unhit by metals search .....May 103
Moves to provide technicians for colonies .....May 104
Reviews sources of strategic minerals. .....Mar. 86
Edgar:
Manganese Products uses electric furnace on phosphate rock.....May *98
Education, Engineering:
Today's triple challenge to the engineer. A. M. Stuehle.....June *52
El Bolso .....Oct. n142
El Dorado Gold .....Sept. n129; Nov. n138
El Pao .....May n146
El Pen-Rey .....Oct. n142
Elder .....Sept. n136; Oct. n136
Eldona Gold .....July n182; Oct. n136
**Electrical Control and Equipment:**
Cable testers reveal causes of rope wear and failure.....Oct. *72
How mining men are using electronics today. J. A. Setter.....pt. 1 Apr. *75; pt. 2, June *72; pt 3, Sept. *84
Mine power through 44,000-v. gas-filled cable. Clark & Hanson.....Aug. *60
Power rectifiers for mines. W. R. Morton .....May *78
Electro Manganese:
Private enterprise succeeds with electrolytic manganese .....July *128
Electro Manganese Corp.:
A decade of electrolytic manganese. R. H. Bennett.....Oct. *80
Electrolytic Zinc .....
Jan. n129; Feb. n162; June n136; Sept. n146
Elkhorn .....Dec. n118
Embury Lake .....Feb. n162
Emerald Glacier .....July n185
Emerald Isle .....Jan. n113
Emperor Gold .....Feb. n173
Empire Lee .....May n129
Empire Mining & Metallurgical Congress .....Apr. n105
Empire Star .....Jan. n119; Sept. n120
No power needed to lower ore cars with this sheave.....May *112
Empire Zinc .....July n160; Nov. n138
Empresa Minera Huanuchuco.....Sept. n144
Engineering & Mining Journal:
E.&M.J. outlook (chart).....Sept. 67
Reprints available .....Sept. 113
Engineering Office:
Self-illuminated backsight aids mine surveyors. W. J. Waylett .....June *65
Time-study method exposes mining bottlenecks. Bitner & Mitchell..Jan. *68
Engines .....June *106
Erie .....Aug. n114; Nov. n110
Erickson & Bishop .....Dec. n122
Estelle .....Aug. n110
Esterly .....Nov. n139
Eureka .....Apr. n128
New flow in shaft delays further pumping .....Jan. 88
Eva May .....Mar. n112
Exploration (see Geology, Drilling and Prospecting):

## F

Fad .....July n162
Fairview Placers .....Aug. n110
Falconbridge Nickel ....June n124; July n180
Federal Mining & Smelting .....
.....June n118; Aug. n111; Dec. n116
Federal Page .....Sept. n124
Feldspar:
New company floats feldspar....July *125
Feldspar Mining Co.:
Froth flotation .....July *125
Fernandina Phosphate .....Aug. n111
Finland:
Mineral position of ECA nations. Hercourg & Stigerlike .....Mar. *83
Firth-Sterling Steel .....Apr. n124
Fischer .....June n121
Flotation (see Concentration)
Fluorspar:
Kentucky-Illinois fluorspar .... July n170
Utah's new mining district. Fitch, Quigley & Barker.....Mar. *83
Forest Queen .....June n114
Forty-Four .....May n141; Nov. n148
Frasel & Scott.....Aug. n118
Freddies North Lease.....June n134
Free Enterprise-Silver .....Dec. n120
Free State Development & Investment.. .....Feb. n170
Free State Geduld.....Apr. n148; July n195
Front Range .....Apr. n124; Sept. n121
Frood-Stobie:
Tailings for stope filling .....May *88
Funkhouser .....Aug. n111
Furukawa .....Dec. n135

## G

Galena-Platteville area in Mississippi Valley where new ideas made mines. Lyons, Heyl & Agnew.....July *106
Gamage .....Oct. n123
Garfield Chemical .....
.....Feb. n149; July n168, 167; Oct. n133
Garnets:
Shift to new separator cuts garnet milling costs. Vogel & Bitzer.....Aug. *62
Gem State Consolidated .....Dec. n116
General Base Metal .....Nov. n151
General Connor .....Aug. n119
General Exploration, Ltd. .....Oct. n148
General Gold .....Oct. n122
General Reduction .....Sept. n122
Geneva Steel .....Dec. n124
**Geology:**
Airborne magnetic survey in Maine. P. M. Hurley .....Aug. *52
Can a study of topography locate undiscovered mineralized areas? E. V. Reinhardt .....Sept. *90
Cuba has potential tungsten mines. P. A. Bundy .....Aug. *78
Gravity meter survey leads to ore discovery. Frederick Romberg ....Mar. *52
Magnetometer cuts survey time ...Sept. *114
Mesabi Range meeting higher underground costs. E. P. Pfleider (charts & tables) .....Nov. *100
New barite possibilities revealed in the Carolinas. E. C. Van Horn...Jan. *76
New radio technique now useful to explore mineral deposits .....May *81
San Manuel—our most promising copper area. W. P. Goss .....July *92

e editorial; n news; c comment and criticism; * illustrated

Sedimentary strata experience can aid in rockburst study. R. G. Wuerker ..... June *60

**Geophysics** see Geology

**Germany:**

Lightweight rock drill uses external water feed ..... Aug. *94
Shaker conveyors used for ore and fill ..... Feb. *126

Getchell ..... Apr. n129; May n134; July n162
Gilbert ..... July n172
Gilpin ..... Apr. n124
Gladstone Mountain ..... Jan. n111; July n176
God'e Lake Gold ..... June n126
Golconda ..... Oct. n125; Nov. n136
Golconda Lead ..... Jan. n111; Sept. n124

**Gold:**

Could the treasury raise its gold price overnight? H. W. Bratter ..... Dec. 72
East Sullivan starts right with low costs ..... Nov. 95
Gold still is a magnet ..... Jan. e53
Hollinger's wage incentive. J. W. Thomson ..... Nov. *82
How profitable is gold mining. Herbert Bratter ..... Mar. *76
South Africa and fund agree on gold sales ..... June 90
Vancouver, B. C., gold dredging job made possible by aluminum dredge. J. B. Hutti ..... Apr. *72
West Australian Chamber of Mines questions subsidy of gold ..... May 150
World gold production and central gold reserves. M. A. Kriz (tables) ..... Feb. 70

Gold Beach Dredging ..... July n188
Gold Bond ..... Sept. n133
Gold Cross ..... Aug. n110
Gold Exploration & Finance Co. of Australia ..... Oct. n146
Gold Fields Rhodesian Development. Mar n130
Gold Hill Dredging ..... Aug. n110; Nov. n129
Gold Hunter ..... June n118
Gold King ..... Feb. n144; Oct. n134
Gold Mines Cons. ..... May n129
New mines from old ..... July *129
Gold Mines Development ..... Dec. n116
Gold Mines of Kalgoorlie ..... Oct. n144
Gold Placers ..... Jan. n119
Gold Plate ..... Nov. n139
Gold Prospecting & Development .. Aug. n128
Gold Resources ..... Dec. n134
Gold Syndicate ..... Jan. n111
Goldbach Consolidated ..... Sept. n128
Golden Crown ..... Jan. n113; Feb. n143
Golden Cycle ..... Jan. n112; Feb. n144; Apr., n124, May n128; June n114; Oct. n122
Golden Door ..... Feb. n143
Golden Ledge Syndicate ..... May n144
Golden Manitou ..... July n182; Dec. n127
Goldfield Consolidated ..... July n176; Nov. n142
Grace & Co. ..... Sept. n143
Gracie Gold ..... Dec. n120
Granby Consolidated Mining & Smelting Jan. n124; June n127; July n185; Sept. n141
Grandview ..... Nov. n133
..... Aug. n120; Nov. n133, 141; Dec. n125
Grant ..... Aug. n114
Great Boulder ..... Nov. n153
Great Boulder Pty. Gold. June n136; Oct. n144

**Great Britain:**

Blast furnace industry depends upon both home and imported iron ores. Dr. D. D. Howat ..... June *66
Iron mines also have their problems. Dr. D. D. Howat ..... May *74
Mineral position of ECA nations. F. R. Brewster (map) ..... Jan. *61

Great Fingall Exploration ..... May n150, 152
Great Lakes Carbon ..Mar. n120; Dec. n122
Great Mountain Iron ..... Mar. n122
Great Northern Iron Ore Properties. Sept. n125

Greater Butte:

Building a Greater Butte ..... July *100

**Greece:**

Mineral position of ECA nation. O. P. Riker (Map) ..... Jan. *65

Green Mountain ..... Aug. n116
Greene, A. P., Fire brick ..... Oct. n123
Grimes Divide ..... Aug. n110
Grizzly ..... Apr. n124
Ground Hog ..... July n160
Guichon .....
Feb. n165; July n185; Oct. n139; Dec. n128
Gunnar Gold ..... Nov. n145
Gwillim Lake Gold .....
Feb. n163; Apr. n141; Aug. n122; Dec. n128


## H


H & H ..... June n119
Hale-Georgia Mineral ..... Oct. n123
Haley-Young ..... Oct. n126
Hamlen ..... Nov. n139
Hanford ..... Dec. n126
Hanna, M. A. Co. ..... Jan. n116; Feb. n154; Mar. n111; Apr. n133; May n127; June n110; Oct. n128; Dec. n119

Hanna Coal Co.

Special equipment and modern design compares costs ..... Apr. *110

Hanna Coal & Ore ..... Nov. n134
Hanna Iron Ore ..... Nov. n135
Hanover ..... Oct. n130
Hansey Gold & Silver ..... Sept. n124
Hansy Copper & Gold... Sept. n122; Oct. n126
Hard Rock ..... Aug. n121
Harding ..... Nov. n139
Harrietville, Ltd. ..... Feb. n174
Harvey Mudd ..... Sept. n128
Hasaga Gold ..... Sept. n135

**Haulage and Transport:**

Bigger truck horsepowers ..... June 82
Cherry picker hoists cars, then transfers them ..... Jan. *94
Cost cutting at Star mine helped by many factors. R. W. Heyman.. Nov. *90
How mining men are using electronics today. J. A. Setter ..... pt. 3 Sept. 87
Mesabi tries new 500-hp. hauler.. June 82
Mining industry watches drilling outcome. A. H. Hubbell. pt. 1, Feb. *96; labor saving, lower costs are prime objectives ..... pt. 2, Mar. *68
Mobile tail block gives scraper economy ..... Aug. *58
Pend Oreille incline to have tractor trolley and belt conveyor ..... July *104
Progress in diesel haulage underground ..... Sept. 96
Scraper and shovel operate together in stope ..... Nov. *114
Shaker conveyors used for ore and fill ..... Feb. *126
Spring-head-end for trolley wires. Mar. *107
Time-study method exposes mining bottlenecks. Bitner & Mitchell .. Jan. *68
Tires retard ore on timbered chute Dec. *94
Transport capacity in freezing weather, Minn. ..... Aug. 80
Unloading frozen ore cars at Combined Metals Reduction. M. J. Kennard... ..... Aug. *59
Welded rails may mean better haulage ..... Oct. *102
World's longest belt conveyor will reduce transportation costs in the "American Ruhr" ..... Mar. *94

Hayden Hill ..... Sept. n123
Hecla ..... Feb. 149, 150; May n134; July n179; Sept. n122, 123
Cherry picker hoists cars, then transfers them ..... Jan. *94

Hecla Cons. Copper ..... May n133

Hecla Mining Co.:

Cost cutting at Star mine helped by many factors. R. W. Neyman.. Nov. *90

Hector ..... Aug. n114
Hedley Mascot .....
Mar. n124; Apr. n143; June n128; July n185; Aug. n121; Oct. n138; Dec. n128

Hedley Monarch Gold ..... Feb. n165
Helena ..... Oct. n131
Hematite in the Teller District, Alaska. ..... Aug. n108
Henrietta ..... Apr. n128
Hercules Gold ..... Dec. n134
Hermosa ..... Apr. n142
Hicks Creek ..... Apr. n135
High Grade ..... June n121; Aug. n110
Highland Bell .....
..... Apr. n143, June n126, Aug. n123
Highland Surprise ..... Feb. n150; Dec. n118
Hilf-Annex ..... Jan. n117; Feb. n154; Mar. n111, June n110; Oct. n127
Hill Top ..... Apr. n124
Hillside ..... Nov. n120
Hodge ..... Oct. n122

**Hoisting:**

Cable reel lifting jacks ..... Jan. *96
Cable testers reveal causes of rope wear and failure ..... Oct. *72
For shaft hoisting ..... June 82
Labor saving, lower costs are prime objectives. A. H. Hubbell ..... Mar. *68
No power needed to lower ore cars with this sheave ..... May *112
Sinking bucket operates with hinged guide-shoes ..... Feb. *128
South Agnew skip hoist is remote-controlled ..... Oct. *82

Holland:

Unique carbide bits ..... Aug. *94

Hollinger Consolidated Gold:

Wage incentive. J. W. Thomson.. Nov. *82

Homestake ..... Apr. n132

**Hoover Commission:**

Asks changes in code ..... Apr. 102
Recommends modernizing mining laws. ..... May *68
U. S. Dept. of Interior should be streamlined, says Commission.. Apr. 103

Hope ..... Sept. n124
Hope Silver-Lead ..... Jan. n111; Oct. n126
Horizon ..... Aug. n114
Hornet ..... June n115
Horsehead Lime ..... Mar. n116
Houston-Thomas ..... July n182
Gravity meter survey leads to ore discovery. Frederick Romberg ... Mar. *52

Howe Sound .....
Jan. n111; Apr. n130; Sept. n133; Dec. n126
Four-machine jumbo for large drifts. ..... Mar. *108
Some underground changes at the Holden mine. J. B. Hutti ..... Apr. *84

Howe Sound Exploration. Apr. n140; Aug. n122
Hubbard ..... Apr. n130
Hudson Bay Mining & Smelting .....
..... Feb. n161; Apr. n140; May n141; July n186; Oct. n135

Hull ..... Dec. n116

Humphreys Gold:

Mining titanium ..... July *123

Hunter ..... Sept. n123
Hunter Creek ..... Nov. n133
Huronn ..... Apr. n135; July n179; Aug. n116
Hyderabad Gold ..... Apr. n130


## I


Ibex-Sunday ..... July n168
Idaho Maryland ..... Jan. n110; May n137; July n165; Sept. n120; Dec. n114

Adjustable gib pole for slusher block. ..... Apr. *109

Sand-slime stope filling proves satisfactory. Krebs & O'Donnell .... Jan. *54
Turntable is used to reverse loader... ..... June *96

Idaho Mining Assn. meeting ..... Aug. 90
Idarado ..... Mar. n119; Dec. n114
Independence ..... Aug. n108, 120; Nov. n127

India:

To extract silver from coins ..... Oct. 108

Industria Colombiana de Barita ... Dec. n130
Inland Chemical ..... June n113
Inland Steel .....
Feb. n154; Mar. n112; Apr. n134; May n127; June n111; July n171, 174; Aug. n114

Inspiration Consolidated Copper .....
..... Aug. n109; Dec. n114

New open-pit operations. P. D. J. Honeyman ..... July *95

Insulating Materials:

Demand for insulating materials in 1946. D. G. Runner ..... Feb. 93

International Minerals & Chemical Corp. ..... Apr. n127; May n132; Aug. n118, Sept. n129, Dec. n121

Carlsbad potash industry expands. Jack Pierce ..... July *135

International Mining Days Celebration ..... Dec. *93

International Nickel .....
..... Jan. n120; May n142; June n124; Sept. n137, Nov. n143, Dec. n126

New matte treatment and nash roasting processes ..... July *144
Plant for smelting of concentrates to be built ..... Feb. 113
Tailings for stope filling at the Frood-Stobie mine ..... May *88

International Smelting & Refining .....
..... Mar. n118, May n132, Sept. n131

Inter-State Iron .....
Feb. n154; May n126; June n110; Aug. n114; Sept. n125, 126, Oct. n127; Dec. n119

Open-pit maintenance costs cut with new alloy steel ..... Oct. *86

Interstate Products ..... Nov. n134

**Iron:**

Birmingham's future iron ore supply ..... Aug. 80

Britain gets half its iron from its lean ores. Dr. D. D. Howat ..... June *66
Britain's iron mines also have their problems. Dr. D. D. Howat .... May *74
Canada's future brightens as producer of iron ore. J. B. DeMille ..... Apr. *90
Charleston lean-ore plant to treat old stockpile. R. W. Keelin ..... Aug. *80
Cleveland-Cliffs combats rising costs. A. H. Hubbell ..... Nov. *96
Eagle Mountain, new source of iron ore for Fontana. J. B. Hutti ... Aug. *92
El Pao district, Venezuela, supplies iron ore to Bethlehem Steel ... Aug. *70
Five new plants will process powdery iron. ..... Sept. 100
Getting at Itabira's iron. L. J. Hugi. lett ..... Oct. *76
Iron from Mesabi taconite ..... July *86
Labrador iron ore nearest outside source ..... July *88
Mesabi is meeting higher underground costs. E. P. Pfleider (charts & tables) ..... Nov. *100
New blast furnace uses low-grade iron ore ..... Sept. 88
New ore for Republic ..... July *91
The problem of iron ore . . . and how it will be solved ..... July *84
Republic Steel will work new shoots at Chateaugay mine ..... Aug. *91
Rotary-kiln nodulizing is simple, costs less. H. Berg ..... Aug. *56
Sintering to raise iron ore output in Brazil ..... June *59
Venezuela's iron ore coming soon.... ..... July *90

Ironback Gold ..... Dec. n134

Iron King:

Zinc-lead workings ..... July 118

Iron Knob ..... Oct. n146
Iroquois ..... Mar. n116; April. n130; Oct. n133
Isbell Construction ..... Aug. n117
Island Mountain .....
May n144; Aug. n126 Sept. n138; Oct. n139

Isle Royale Copper .....
.....Feb. n155; May n127; Aug. n116

How to handle big masses of native copper ..... June 64

Itabira ..... May n148


## J


Jackson ..... Oct. n140
Jagersfontein ..... Aug. n130; Sept. n149
Jalore ..... Apr. n134; July n180

Japan:

Matsuo sulphur mine may become an open pit. P. C. Merrill ..... Jan. *72

Jeep Gold ..... Jan. n121; Mar. n123; May n141; Aug. n122, Oct. n135

Jet piercing:

Another step in jet piercing. G. P. Lutjen ..... Aug. *64

Small hand blowpipe for jet-piercing 1¾ in. diameter holes ..... Aug. *80
Jim Crow Creek ..... June n136
Johns Manville ..... Aug. n122
Diatomite: its mining and processing in California. J. B. Hutti ..... Aug. *75
Jones & Laughlin ..... Jan. n118; Feb. n154; Oct. n128; Dec. n119
Juanita ..... June n116
Julia ..... June n112
Jumbo Extension ..... Dec. n120

## K

Kaiser ..... Mar. n115
Kaiser-Frazer ..... June n117
Kanleri Gold Dredging ..... Apr. n154
Kaolin:
Modernizing dry kaolin milling in South Carolina. P. M. Tyler ..... June *56
Kaslo Silver Lead ..... Jan. n122
Kearny ..... Aug. n118
Kelly ..... Feb. n145
Kelowna Exploration ..... Oct. n141; Dec. n128
Kennecott Copper ..... Jan. n112; Feb. n140, 143; Apr. n124; May n130; June n117, 118; Aug. n117, 119; Sept. n120, 130; Oct. n132; Dec. n120, 124
Builds modern refinery ..... July *97
Gold mining lease in Africa ..... July 154
Labor trouble ..... Jan. 88
Resumes mining pending strike study ..... Mar. 91
Strike not settled ..... Feb. 140
Three executives perish in accident ..... Oct. *104
Kennecott Utah:
New refinery well along ..... Feb. 113
Kenville Gold ..... Jan. n122; Nov. n147
Keokuk Electro-Metals ..... May n136; Oct. n133
Keystone ..... Nov. n129
Kicking Horse ..... Mar. n123
Kimball ..... Mar. n113
King Island Scheelite ..... Feb. n176; Apr. n154; June n136
King Lease ..... June n114
Kings Mountain-Gaffney:
New barite possibilities revealed in the Carolinas. E. C. Van Horn ..... Jan. *76
Kirk, Morris P. & Son ..... Jan. n112; Apr. c126
Kirkland Lake Gold ..... Apr. n137
Klondike gold rush recalled. J. R. Stirrett ..... Feb. 178
Klondyke Mining & Milling ..... Dec. n114
Kolar Gold ..... Apr. n150; June n138; Sept. n152
Kolar Gold Fields ..... May n150

## L

Labor:
Are the non-Communist affidavits merely slips of paper? NLRB says it's up to Dept. of Justice ..... Sept. 101
Coeur d'Alene labor situation is tense ..... Oct. n123
Communists still threaten metal-mine labor relations. J. M. Gambatese ..... Apr. *68
Deferment of miners up to local boards ..... Jan. 90
Demands meet trouble in Congress ..... Apr. 102
Employee testing service can save money ..... Sept. 101
Grandview strike brings trouble from miners ..... Feb. n148
Hollinger's wage incentive. J. W. Thomson ..... Nov. *82
MMSW local at Alcoa loses bargain rights ..... Feb. 123
MMSW union in jam with CIO leadership ..... June 86
MMSW wage policy ..... June 105
Mine-mill officers to sign non-Communist affidavits at last ..... Aug. 90
Mining's labor relations give no cause for pride. J. R. Richardson ..... Dec. *78
Overtime on overtime ended by new law ..... Sept. 98
Safety program can also curb costs—compensation insurance statistics. W. E. Jones ..... Nov. *86
Split with CIO looms as Mine, Mill and Smelter Workers meet ..... Oct. 106
Travis drops Reds as mine, mill complies ..... Sept. 98
What is the total cost of day's pay labor? W. C. Page ..... May *85
Labrador:
Labrador iron ore can compete with the Mesabi District ..... July *88
Labrador Mining & Exploration ..... Mar. n122; Dec. n126
Lady Frances ..... Aug. n118
Lake George Mines Pty.
Ladder-mounted stopers simplify drilling ..... June *94
Lake Shore ..... June n124; Dec. n126
Carbide-tipped steel in jack-leg plug-gers tried ..... Aug. 80
Lifter-loader is handy in mill ..... Mar. *107
Mechanical equipment speeds timber framing. John Jamieson ..... May *72
Lake Superior Mines Safety Council meets ..... June 89
Lake Superior Safety Council ..... June n110
Lamaque Gold ..... Dec. n127
Laminacion de Metales ..... Apr. n146
Lark ..... Aug. n116
Lead:
A better way to treat Parkes process crusts. Schlechten & Shih ..... Oct. *80
Cominco's streamlined smelter ..... July *139
Consumption and production, 1948. R. L. Ziegfeld (tables) ..... Feb. 77
Impoverishment of ores, 1939 and 1947 (table) ..... Nov. 75
Lead and zinc ore grades and costs, 1935-47 (table) ..... Nov. 75
Lucky Friday pays its way as it develops ore at depth ..... July *126
The Metaline mining district. W. L. Zeigler ..... July *102
New mines from old. W. E. Scott Jr. ..... July *129
New orebodies help raise Arizona's lead-zinc output. E. D. Wilson ..... July *118
Prices of lead, zinc, copper, tin, 1920-48 (table) ..... Nov. 73
Sidney mine steps up from small to major producer ..... July *127
Sullivan improves mine with underground coarse crushing system ..... July *152
Tsumeb Corp., Ltd., now operating a reopened lead-zinc property ..... July *150
U. S. primary and secondary copper and lead production (chart) ..... Nov. 74
Zellidja—study in cooperation in production of lead and zinc ..... July *148
Lead Industries Ass'n meeting ..... May 105
Lee ..... Mar. n117
Lee Gordon ..... May n142; Aug. n122
Legislation:
California bill to pay reparations to mine operators for war closed mines ..... Apr. 128
Congress to review six measures on mining ..... Jan. 90
Leitch Gold ..... Aug. n121; Nov. n145
Leonora Mining & Milling ..... May n130
Lepanto Consolidated ..... Mar. n132; Apr. n152; May n152; June n138; July n204; Sept. n145; Nov. n151
Lexington ..... June n115
Libanon Gold ..... Feb. n171; Apr. n149; June n134; July n193
Liberia:
Iron ore deposits in Liberia secured by republic ..... July *91
Loan for iron ore ..... June 87
Limestone Products ..... June n124
Lindsn Gold ..... Oct. n144
Lithium:
Demand in 1948 ..... Feb. 95
Little Long Lac Gold ..... Sept. n134
Little Mattie ..... Apr. n124
Little Winnie ..... Aug. n110
Livingston ..... Feb. n149; May n138
Loading:
Adjustable gin pole for slusher block ..... Apr. *109
Mining industry watches drilling outcome. A. H. Hubbell, pt. 1, Feb. 102; labor saving, lower costs are prime objectives, pt. 2 ..... Mar. *68
Mucking Quemont's No. 2 shaft ..... May *84
New mucker speeds incline sinking at Bunker Hill ..... Aug. *69
Shaft muckers ..... June 82
Special equipment and modern design pares costs ..... Apr. *110
Turntable is used to reverse loader ..... June *96
Longyear, E. J. ..... Dec. n118
Lower Bulolo Gold Dredging ..... Aug. n129
Lucille ..... Mar. n115
Lucky Four ..... June n128
Lucky Friday:
Pays its way as it develops ore at depth ..... July *126
Lucky Friday Silver-Lead ..... Feb. n149; Apr. n132; May n134; Aug. n112; Oct. n125; Nov. n132
Lucky Jim ..... Apr. n142
Lucky Jim Zinclon ..... Oct. n128
Lucky Tiger-Combination Gold ..... June n115
Luipaardsvlei Estate & Gold ..... Feb. n171
Lunward Gold ..... Nov. n145
Lupton ..... Sept. n122
Luzon Stevedoring ..... Oct. n147
Lynchburg ..... Nov. n138
Lydenburg Platinum ..... Sept. n150

## M

M & C ..... Sept. n133; Nov. n142
Macassa ..... Feb. n159; Apr. n138; Dec. n126
MacLeod-Cockshutt Gold ..... Aug. n121
Madeco ..... Nov. n149
Magalia ..... Nov. n129
Magma:
Producer of zinc ..... July 118
Magma Copper ..... Jan. n113; Apr. n126
Effect of business cycle costs on Magma, 1926-37 (table) ..... Nov. 77
For lower-cost regrinding. F. T. Davis ..... Oct. *85
New mill has operated continuously ..... July 96
Magnesium:
Trends in production in 1948 ..... Feb. 85
Mahoning ..... Aug. n114
Maintenance and Shops:
Heater simplifies removal of mines locomotive tires ..... Apr. *108
Hoist drum repair ..... Aug. *96
How to get better service out of V-belts. E. A. Gahl ..... Aug. *96
Lifter-loader is handy in mill ..... Mar. *107
Mechanical equipment speeds timber framing. John Jamieson ..... May *72
Oil drum rack and truck ..... Jan. *96
Open-pit maintenance costs with new alloy steel ..... Oct. *86
Packing gland stops pipe leak ..... May *108
Plate-bending rolls for mine shops ..... May *110
Pneumatic tools for the mine shop ..... Dec. *98
Tongs for lifting car axles safely in mine shops ..... June *98
Welding may cut your dredge maintenance costs. H. B. McClure ..... Sept. *80
Malartic Gold Fields ..... Jan. n120
Management:
Communists still threaten metal-mine Labor relations. J. M. Gambatese ..... Apr. *68
Let's get more good men for mining. E. S. Tillinghast ..... May 82
Mandat-d Alluvials ..... Nov. n154
Manganese:
Conserve manganese to stretch supplies ..... May 102
A decade of electrolytic manganese. R. H. Bennett ..... Oct. *80
Electrolytic manganese ..... July *128
Production in 1948. N. B. Melcher ..... Feb. 90
South Dakota manganese and MVA plan ..... May 97
Manganese Products
Electric furnace used on phosphate and olivine ..... May *98
Western phosphate output soars ..... July *130
Manitoba Basin Cons. ..... Feb. n161
Maricvale Consolidated ..... Mar. n120
Mars Metal ..... Jan. n110
Martin ..... Dec. n120
Mary Murphy ..... May n128
Masbate Consolidated ..... Dec. n172
Masinloc ..... Dec. n131
Matachewan Cons. ..... Apr. n137
Materials Handling
Mobile tail block gives scraper economy ..... Aug. *58
Materials handling see also Loading; Haulage and Transport
Mather "A" ..... Mar. n110
Mather "B" ..... July n173; Nov. 150
Mazapil ..... Oct. n142
Mc Crea-Townsend ..... Aug. n110
McIntyre Porcupine ..... Feb. n158
Meadow Creek ..... Nov. n141; Dec. n125
Mercury:
..... May n136; July n177; Nov. n141
Melvina ..... Apr. n124
Production in 1948. H. M. Meyer ..... Feb. 87
Mesabi Range:
Meeting higher underground costs. E. P. Pfleider (charts & tables) ..... Nov. *100
Stripping provides use for Gradall ..... Sept. 96
Messina Development ..... Mar. n130
Metaline mining district in Washington. W. L. Zeigler ..... July *102
Metaline Mining & Leasing ..... Nov. n141; Dec. n125

**Metallurgy, Electro:**
Cerro de Pasco's new producing units show innovations ..... July *146b
A decade of electrolytic manganese. R. H. Bennett ..... Oct. *80
Kennecott builds modern refinery ..... July *97
Private enterprise succeeds with electrolytic manganese ..... July *128

**Metallurgy, Hydro**
Rapid determination for calcium. J. E. Williamson ..... Mar. *75

**Metallurgy, Pyro:**
American Smelting & Refining Co.'s continuous casting process ..... July *145
American Smelting & Refining Co.'s western smelters ..... July *143
A better way to treat Parkes process crusts. Schlechten & Shih ..... Oct. *80
Bunker Hill modernizes mine, mill and smelter. J. B. Haffner ..... July *109
Calculating charges for the precipitation method of antimony smelting. Dr. Chung Yu Wang ..... Mar. 67
Chuquicamata begins building plant to treat sulphide ores ..... July 146a
Cominco's streamlined smelter ..... July *139
Fuming plant treats 12% slag—American Smelting & Refining ..... July *115
How U. S. Smelting attacks problem of cost reduction ..... Nov. *80
International Nickel develops new matte treatment and flash roasting processes ..... July *144
Inverting standard furnace increases smelter profits ..... June *70
New Jersey Zinc develops a new condenser. Bunce & Peirce ..... Mar. *56
Non-ferrous metallurgy shows advances. A. W. Schlechten ..... Feb. *112
Phelps Dodge projects assure copper for tomorrow ..... July *98
Port Pirie smelter ..... Apr. *82
Selby plant makes liquid $SO_2$ from waste smelter gases ..... July *138
Waste-heat boilers equipped with modern soot blowers ..... May *108
Yellow Pine smelter to produce most of U. S. antimony ..... July *140

**Metals:**
E & M J metal prices 1897-1948 (chart & tables) ..... Feb. 82
Ferro-alloy metals. C. W. Merrill ..... Feb. 99

Light metals—output. R. J. Lund..Feb. 83
Metals in review (tables) .....Feb. 70
Minor metals. C. W. Merrill ....Feb. 86
Metal Producers of Los Angeles....Jan. n112
Metrecore, Ltd. .....Aug. n110

Mexico:
Bank of Mexico to market silver "barter coin" .....July *154
Subsidy for mining .....Jan. n124
Miami Copper .....Feb. n143; Aug. n109
Copper production from the mine..July 95
Michael Breen .....May n128
Microfilm used for periodicals .....Aug. 92
Middle Witwatersrand .....Sept. n149; Oct. n148; Dec. n132

Midvale:
Furnace rebuilt .....Feb. 115
Miller Creek Placers...June n129; July n187

**Milling:**
Acid removes lime coating on filters .....Apr. *108
Britain gets half its iron from its lean ores. Dr. D. D. Howat .....June *66
Bunker Hill modernizes mine, mill and smelter. J. B. Haffner .....July *109
Charleson Iron Mining Co. to treat old stock pile. R. W. Keehn .....Apr. *80
Clocks indicate interruption of ball mill feed .....May *112
Crushing plant design. L. M. Anderson, pt. 1 .....Oct. *94
Diatomite: Its mining and processing in California. J. B. Huttl .....Aug. *75
General advance marks all fields in milling. R. H. Ramsey .....Feb. *106
Greater Butte ore milling .....July *100
Infra-red heater lowers concentrate drying costs. J. T. Hanvey Jr...Sept. *82
Iron from Mesabi taconite .....July *86
Modernizing dry kaolin milling in South Carolina. P. M. Tyler .....Feb. *56
Safety device protects thickeners..Sept. *110
Sand-slime stops filling proves satisfactory. Krebs & O'Donnell .....Jan. *54
Shift to new separator cuts garnet milling costs. Vogel & Bitzer ..Aug. *62
Soft rubber chute bottom prevents hang-ups .....Nov. *114
Sprayer breaks down mill froth ..June *96
Syphon for mill floor sumps .....Apr. *109
Minas de Guatamo .....Feb. n167
Mindanao Mother Lode .....Jan. n128; Mar. n132; Apr. n152; May n152; June n138; Oct. n147; Nov. n156; Dec. n131
Mine Examination and Valuation:
Is use of the Hoskold formula justified? D. H. Eldridge .....Aug. *72
Mineral & By-Products .....Aug. n110

**Mineral Economics:**
Aluminum production and uses in 1948. .....Feb. 83
Antimony consumption and production in 1948. S. A. Gustavson .....Feb. 87
Arsenic production in 1948. S. A. Gustavson .....Feb. 87
Beryllium consumption in 1948. S. A. Gustavson .....Feb. 86
Bismuth production in 1948. S. A. Gustavson .....Feb. 87
Cadmium output in 1948. R. H. Mote. .....Feb. 89
Cobalt consumption in 1948. H. W. Davis .....Feb. 88
Copper production in 1944-1948. H. H. Wanders .....Feb. 75
Ferro-alloy metals. C. W. Merrill Feb. 90
Gold production and central gold reserves. M. A. Kirz (tables) .....Feb. 70
How profitable is gold mining? Herbert Bratter .....Mar. *76
Lead consumption and production, 1948. R. L. Zoeckfeld (tables) .....Feb. 77
Light metals—output. R. J. Lund .....Feb. 83
Magnesium production trends in 1948. .....Feb. 85
Manganese production in 1948. N. B. Melcher .....Feb. 90
Mercury production in 1948. H. M. Meyer .....Feb. 87
Metals for the future. C. W. Wright .....May *94
Mining's economic prospect holds promise of good year (tables) .....Feb. 67
Minor metals in 1948 .....Feb. 86
Molybdenum production in 1948. H. W. Davis .....Feb. 92
Nickel production in 1948. H. W. Davis .....Feb. 91
Non-metallics in 1948. D. G. Runner. .....Feb. 93
Platinum-group metals demand in 1948. H. W. Davis .....Feb. 88
The real danger of high costs. Dato Malozemoff .....Nov. *72
Silver as money. Herbert Bratter Jan. 79
Silver production, 1948. D. H. Leavens (chart & table) .....Feb. 73
Tin consumption and supply, 1947-1948. Erwin Vogelsang (tables) Feb. 81
Titanium production in 1948. H. M. Meyer .....Feb. 89
Tungsten production in 1948. H. W. Davis .....Feb. 92
Zinc exports and imports—U. S. slab zinc statistics, 1941-1948. C. R. Ince (chart & table) .....Feb. 79

Mineral King .....Feb. n151; July n175

Mineral Policy:
The snarl in stockpiling means trouble for you. R. H. Ramsey .....Sept. *72
Veto curbs settlement of war claims. .....Aug. 88
Minerals Engineering .....Sept. n122

**Mineral Resources:**
Birmingham's future iron ore supply. .....Aug. 80
Britain's iron mines also have their problems. Dr. D. D. Howat....May *74
California wins mineral deposit unit. .....Oct. 106
Canada's future brightens as producer of iron ore. J. B. DeMille.....Apr. *90
Chromite production in 1948. N. B. Melcher .....Feb. 91
Mineral position of ECA nations—Finland. Herman Stigzelius .....Mar. *83
Great Britain, F. R. Brewster (map) .....Jan. *61
Greece. O. P. Riker (map) .....Jan. *65
Norway. Arne Solem .....Mar. *82
Sweden. Geoffrey Smith .....Mar. *78
New barite possibilities revealed in the Carolinas. E. C. Van Horn.....Jan. *76
The problem of iron ore . . . and how it will be solved .....July *84
Utah's new mining district. Fitch, Quigley & Harker.....Mar. *63
Minerales de Chihuahua.....Oct. n142
Minerva Oil .....Dec. n119
Mines Exploration .....June n114
Mines Management .....Feb. n148; May n136; July n176
Mines Operating .....Sept. n140

**Mining:**
Aluminum dredge designed for difficult placer job. J. B. Huttl.....Apr. *72
Back-hoe mounted on truck used in stripping at Sept. .....Sept. 96
Bunker Hill modernizes mine, mill and smelter. J. B. Haffner.....July *109
Cleveland-Cliffs combats rising costs. A. B. Hubbell .....Nov. *96
Combined Metal Reduction Co. bears down on costs .....Nov. 95
Contour mining at Pend Oreille..July *105
Diatomite: Its mining and processing in California. J. B. Huttl....Aug. *75
East Sullivan starts right with low costs .....Nov. 95
How to handle big masses of native copper in the Lake Superior region .....June 64
Lucky Friday pays its way as it develops ore at depth.....July *126
Matsuo sulphur mine may become an open pit. P. F. Merrill .....Jan. *72
Mechanized drifting speeds development work. J. B. Huttl.....Jan. 67
Mesabi Range is meeting higher underground costs. E. F. Pfleider (charts & tables) .....Nov. *100
The Metaline mining district. W. L. Zeigler .....July *102
Mining in 1867—E&MJ .....Feb. 124
Mucking Queenston's No. 2 shaft.. .....May *84
New mines from old. W. E. Scott, Jr. .....July *129
New mucker speeds incline sinking at Bunker Hill .....Aug. *69
Oil shale mining costs cut by unique equipment. E. D. Gardner....Nov. *92
Open-pit maintenance costs cut with new alloy steel .....Oct. *86
Postwar operating costs higher in the Philippines. W. F. Boericke....Sept. *94
The problem of the cost of mining.... .....Oct. *71
The risks of mining.....Jan. *52
Rock-burst study to be aided by sedimentary strata experience. R. G. Wuerker .....June *60
Sand-slime stops filling proves satisfactory Krebs & O'Donnell....Jan. *54
Sidney mine steps up from small to major producer .....July *127
Stripping problem solved by Simplot. H. B. Fowler.....Oct. *92
Telling young men about mining..Jan. e52
Mining Assn. of Montana meets with new section of National Safety Council .....Feb. *123
Misamia Chromite .....Apr. n151; Sept. n145
Missabe Mountain .....Aug. n113
Mitsubishi .....Nov. n155
Mitsui .....Dec. n135
Moctezuma .....Oct. n142
Modine Kaithwen .....Apr. n124
Molybdenum:
Production in 1948. H. W. Davis..Feb. 92
Molybdenum Corp. .....May n129
Monarch .....Mar. n123
Montana Phosphate Products:
Western phosphate output soars..July *130
Montreal .....Mar. n112; May n126; July n173
Moolyella Tin Development .....May n152
Morning Star .....Mar. n134; Aug. n110
Morocco:
Zellidja—study in cooperation in production of lead and zinc.....July *148
Morris Summit Gold .....Aug. n124
Morton Salt:
New radiotechnique now useful to explore mineral deposits .....May *81
Mount Charlotte .....Nov. n153
Mt. Diablo Exploration .....Mar. n117
Mount Gaines .....Feb. n146
Mount Isa .....Jan. n131; Apr. n153; July n200; Nov. n154
Mount Lyell Mining & Railway .....Jan. n129; Feb. n174; Mar. n135
Mount Morgan ...Jan. n131; Apr. n153; July n209; Oct. n146; Nov. n154; Dec. n135
Mountain Copper .....Jan. n116
Mountain View ....Apr. n144, 153; Oct. n144
Muck, A. A., & Associates.....July n178
Mudrite Chemicals .....Jan. n115
Mufulira Copper .....Jan. n132
Mullen .....Nov. n142
Myrtle Creek .....June n122; July n188
Mysore .....Nov. n155


## N


Nabob .....Jan. n111, Feb. n148
Nancy Lee .....Aug. n116; Oct. n126, 129
Nashenwing .....Jan. n119

National Lead:
Rock drill trims churn-drill bits..Dec. *94
Titanium mining .....July *122
Natomas .....Feb. n150; June n114
Navajo Tribal Council .....Feb. n141
Negaunee .....June n132
Negus .....Jan. n124
Nevada-Massachusetts .....Sept. n129
Nevada Monarch .....Oct. n130
Nevada Scheelite .....Aug. n117
Nevada-Stewart .....Mar. n114
Nevada Uranium Production .....Jan. n18; .....Feb. n150; Apr. n129; July n162
Never Sweat .....Oct. n121
New Broken Hill Consolidated .....Feb. n174; Mar. n135; July n198, Sept. n146; Oct. n145
New Calumet .....Jan. n120; May n140; Aug. n122
New Coolgardie Gold .....June n136
New Cornelia .....May n129
New Goldvue .....June n124
New Guinea Gold Fields .....May n152
New Hilarity .....July n179
New Idria .....Sept. n121; Nov. n121
New Jason .....Apr. n139; July n180
New Jersey Zinc .....Mar. n109
Eastern zinc mines modernize ....July *112
New condenser of undiluted zinc gases. Bunce & Peirce .....Mar. *56
New Jersey Zinc Explorations ....Mar. n125
New Marlon Gold .....Jan. n120
New Mexico Miners & Prospectors Assn. meets .....Apr. 104
New Occidental Gold ..Aug. n128; Dec. n135
New Park ..Aug. n119; Oct. n132; Nov. n140
New Pioneer Central Rand Gold .....Mar. n129, Aug. n130
New Rainbow .....Sept. n124; Oct. n126
New State Areas .....June n133
New York-Alaska Gold Dredging . Sept. n120
Newmont .....Feb. n150; Mar. n118; Apr. n149, May n133; July n164
Newpoint .....Aug. n115
Ngahere Gold Dredging .....June n137

Nickel:
International Nickel develops new matte treatment and flash roasting processes .....July *144
Production in 1948. H. W. Davis .Feb. 91
Nickel Lake .....Apr. n110
Nitrates
Improved handling cuts nitrate industry's costs at Iquique, Chile. Fernando Benitez .....Oct. *90
Nivloc .....Sept. n129
Noble's Nob .....Aug. n128
Noland .....Aug. n122

Non-metallic minerals:
Production in 1948. D. G. Runner..Feb. 93
Nooksack .....Oct. n134
Nor-Acme Gold .....Jan. n120; June n125; July n182
Norlander Reverberatories to handle concentrates .....Feb. 114
Norseman Gold .....Dec. n134
North Broken Hill .....Mar. n135 July n198; Sept. n146; Dec. n135
North Carolina Feldspar:
New company floats feldspar ....July *125
North Deborah .....Feb. n174; Aug. n127
North Hilton Extension .....Feb. n143
North Kalgurli .....Apr. n153; Aug. n127
North Lily ..Jan. n112; Aug. n120; Sept. n132
North Range .....Jan. n18; Feb. n124; Mar. n112; May n126; June n111
Northeast Mining Assn. formed....Feb. 123
Northern Canada .....Feb. n161
Northern Peru Mining & Smelting..July n191
Northern Rhodesia .....May n148
Northern Tin .....Aug. n108
Northwest Aggregates .....Oct. n131
Northwest Copper .....Jan. n110
Northwest Industrial Minerals Conference .....June 90
Northwest Magnesite .....Feb. n148; May n137; July n177; Sept. n133; Dec. n125

Northwest Mining Association:
54th annual convention .....Jan. 87

Norway:
Mineral position of ECA nations. Arne Solem .....Mar. *82
Nugget Placer .....Aug. n110
Nundydroog .....Nov. n155


## O


O'Brien Gold .....Jan. n120
Ogama Rockland .....Jan. n121; Feb. n161; Apr. n140; June n126; Sept. n137; Nov. n148; Dec. n128
Ohio Copper .....May n131

**Oil-shale:**
Demonstrate oil shale mining at Rifle ....Sept. 101
Oil-shale demonstration ....Nov. 119
Unique equipment helps in cutting shale mining costs. E. D. Gardner ....Nov. *92
Ojancos ....Oct. n143
Olamont ....May n135; July n175
Old Abe ....July n162
Mine to be reopened ....Aug. 74
Old Dominion ....July n177; Aug. n129
O'Leary Malartic ....Sept. n136
Oliver Iron ....Jan. n117; Feb. n152; Mar. n111, 112; Apr. n134; May n126; June n119; July n172; Aug. n114; Sept. n126; Oct. n127
Ollvine:
Cypress Island olivine put through electric furnace at Seattle ....May *98
O'okiep Copper ....Apr. n149
Oregon Charcoal Iron ....Oct. n131
Orphan Girl ....Aug. n116
Osiko Lake ....Sept. n136
Oswoldo ....Aug. n118
Owens-Illinois Glass ....Jan. n110
Ozark-Mahoning ....July n171; Nov. n136

## P

P & H ....Mar. n116
Pacific Bridge ....June n118
Pacific Carbine & Alloys ....Nov. n139
Pacific Coast Aggregates ....July n164
Pacific Isle ....May n127; Aug. n113
Pacific Mutual Silver Lead ....Jan. n111; Feb. n148; July n177; Oct. n134
Pacific Uranium Syndicate ....Sept. n138
Paint Products ....June n118
Paipote Copper ....July n190; Oct. n143
Palisades ....Sept. n124
Paringa ....Apr. n153
Paringa Mining & Exploration ....Aug. n127
Park City ....Sept. n132
Park City Consolidated ....Jan. n112; Mar. n118; Nov. n129
Park Copper & Gold ....Oct. n126
Park Utah ....Sept. n132
Park Utah Consolidated ....Apr. n126; May n131; July n166; Aug. n119; Sept. n131; Oct. n132
Patino Mines & Enterprises Cons. ....June n132; Oct. n142
Pato Cons. Gold Dredging ....Apr. n146; Dec. n130
Aluminum Dredge designed for difficult placer job. J. B. Huttl ....Apr. *72
Paymaster Cons. ....July n180
Peerless ....Aug. n116
Peko Gold ....Nov. n153
Pen Rey Gold ....May n144, Aug. n126
Pend Oreille Mines & Metals ....June n119; Aug. n112; Nov. n141
Lightweight portable drill wagon ....Sept. *110
Pen Oreille Mines & Metals:
The Metaline mining district. W. L. Zeidler ....July *102
Ore to be carried out of an incline equipped with a belt conveyor and tractor trolley ....July *104
Zinc to be produced ....Feb. 116
Perlite:
Laboratory furnace for vermiculite and perlite tests ....Dec. *139
Perlite Institute meets ....Nov. n130
Permanente Metals ....Feb. n148; Aug. n120; Sept. n132; Dec. n120, 126
Perry Schroeder ....Sept. n128
Peru:
Cerro de Pasco's new producing units show innovations ....July *146b
Cooking at 14,000 feet. Remer Strong ....Aug. *66
Peru Mining ....July n160
Pewabik ....Nov. n127
Phelps Dodge ....Jan. n115; Aug. n108; Oct. n120
Expansion projects assure copper for tomorrow ....July *98
New smelter at Ajo ....Feb. 112
Philippine Iron ....Jan. n128; July n204; Oct. n147
Philippine Republic:
Postwar operating costs higher in the Philippines. W. F. Boericke ....Sept. *94
Phosphate:
Davison Chemical Corp.'s Phosphate Rock Div. reduces costs ....Nov. 79
Demand in 1948 ....Feb. 95
How Simplot solved complex stripping problem. H. B. Fowler ....Oct. *92
Manganese Products uses electric furnace on phosphate and olivine ....May *98
Western phosphate output soars ....July *130
Pickands, Mather & Co. ....Jan. n116; Feb. n152; Apr. n133; May n127; June n112; Oct. n127; Dec. n119
Pickle Crow Gold ....Sept. n134
Pigmy ....July n171
Pioneer Gold ....Feb. n161, 163; July n123; Aug. n125
Platinum:
Platinum-group metals demand in 1948. H. W. Davis ....Feb. 88
Plymouth ....Apr. n128
PMT ....July n171
Polaris ....May n134; Nov. n133
Polaris-Silver Summit ....July n178; Nov. n132
Polaris Taku ....June n127; Aug. n108
Polk County Lime ....Feb. n150
Poorman ....Aug. n108; Oct. n120
Portage Avenue Gold ....Aug. n122
Portales ....Dec. n121
Porter & Co ....Apr. n130
Potash:
Carlsbad potash industry expands. Jack Pierce ....July *134
Potash Co. ....Apr. n127; Dec. n121
Potash Co. of America:
Carlsbad potash industry expands. Jack Pierce ....July *135
Powell Rouyn Gold ....Apr. n139
**Power Generation:**
How mining men are using electronics today. J. A. Setter, pt. 3 ....Sept. 86
Mine power through 44,000-v gas-filled cable. Clark & Hanson ....Aug. *60
Power rectifiers for mines. W. R. Morton ....May *78
Premier ....Feb. n156; Aug. n130
President Brand Gold ....Apr. n150; Aug. n139; Sept. n150; Dec. n132
President Steyn ....Apr. n148; July n196; Sept. n150; Dec. n132
Preston East Dome ....June n124; July n180
Pribram Ore ....Jan. n138
**Prices:**
Behavior of metal prices since 1800 (charts) ....Nov. 74
E & M J metal prices 1897-1948 (chart & tables) ....Feb. 82
The real danger of high costs. Plato Malozemoff (charts & tables) ....Nov. 72
Privateer ....Sept. n139; Nov. n146
Promistors Gold ....Nov. n147
**Prospecting:**
Airborne magnetic survey in Maine. P. M. Hurley ....Aug. *52
Canada—the bush and I. J. S. Carman ....June *76
Gravity meter survey leads to discovery. Frederick Romberg ....Mar. *52
Mr. Jager drives a prospect tunnel ....July *124
**Public Lands:**
Act waives assessment ....July 154
Alaska bill ....Apr. 136
Hoover Commission asks changes in code ....Apr. 102
Hoover Commission recommends modernizing mining laws ....May *48
Phosphate leasing rules receive approval ....Mar. 86
Pumice Aggregates Sales ....Apr. n127
Pumping, mine:
Simple pump repair ....Jan. *96
Punitaqui ....Oct. n143
Pyrenees Development ....Feb. n151

## Q

Quarta:
Demand in 1948 ....Feb. 95
Quartz Hill ....Mar. n117
Quebec Iron & Titanium ....Jun. n120
Quebec Labrador Development ....Aug. n122
Developing titanium ....July 172
Quebec Smelting & Refining ....Sept. n136
Quemont ....Sept. n135; Dec. n127
Mucking Quemont's No. 2 shaft. May *84
Quesabe ....Sept. n135
Quincy ....Oct. n128

## R

Radio technique now useful to explore mineral deposits ....May *81
**Radioactive Minerals:**
AEC restores lands to public domain. ....Apr. 104
Petrified wood yields commercial uranium ....June *89
Primary uranium orebody found in Colorado ....Feb. 124
Uranium—a job for mining men ....July *136
Rainbow Onyx ....Oct. n130
Rand Leases ....Dec. n132
Randfontein Estates Gold ....June n133
Rare Earths Development ....Mar. n114; Nov. n132
Rare Metals ....Jan. n111
Ravenshoe Tin Dredging ....Nov. n154
Rawhide Queen ....Oct. n129
Ray Mines:
Additional capacity planned ....July 96
Red Hill ....Aug. n119
Manganese Products uses electric furnace on phosphate rock ....May *98
Reed, W N P obituary ....Oct. *111
Reeves Macdonald ....Feb. n163; Aug. n120; Sept. n139; Dec. n125, 128
A major producer ....July *103
Reeves Ranch Dredging ....Feb. n145
Refractories cost money too ....Dec. *74
Renable ....Apr. n137
Renison Associated Tin ....Feb. n176
Republic Steel ....Apr. n105, 133; Aug. n115
Iron ore deposits in Liberia secured by Republic ....July *91
New shoots of magnetite at Chateaugay mine ....Aug. *91
**Research:**
Analyzer aids electrostatic research. Shiou-Chuan Sun ....May *99
A better way to treat Parkes process crusts. Schlechten & Shih ....Oct. *80
Reserve Mining Co.:
Iron from Mesabi taconite (flowsheet) ....July *86
Resin:
Making resin from coal. Ernest Klepetko ....Jan. *81
Resurrection ....June n114
Retallack ....Sept. n140; Oct. n140
Reynolds Metals ....May n143; Sept. n129; Nov. n129
Rhodesia Broken Hill ....Jan. n135
Richmond ....Nov. n135
Rico Argentine ....Mar. n119
Risdon Works ....July n200
Riverside Copper ....Apr. n131
Riverton ....May n128
Robinson Deep ....Aug. n132
Rock Bursts (See Mining)
Rocky Mountain Federation of Mineral Societies Convention ....Oct. 106
Roland Mountain Gold Dredging ....Apr. n129
Ronpibon Tin, N.L. ....Sept. n147
Rosiclare Lead & Fluorspar ....July n171
Round Mountain Gold Dredging ....Nov. n138
Royal Drift ....Sept. n121; Nov. n139
Royal Flush ....June n116
Ruby Basin ....Sept. n122
Ruby Gulch ....July n175
Rustenburg Platinum ....Mar. n130

## S

**Safety and Welfare:**
The carbon monoxide hazard. R. W. Thompkins ....Sept. *76
For better lighting underground ....Dec. 88
Illuminated safety cards teach bunch-blasting method ....Dec. *139
The mine dry at Bralorne Mines. Swanston Gibson ....Sept. *88
"Safety First" on the Rand pays dividends. J. M. Lawless ....Apr. *94
Safety program can also curb costs. W. E. Jones ....Nov. *86
Thickeners protected by safety device. ....Sept. *110
Warehouse truck made safer ....June *98
St. Anthony Mining & Development:
Lead-zinc workings ....July 118
St. Helena ....Mar. n130; Apr. n148; June n134; July n195; Sept. n150; Dec. n132
St. Joseph Lead ....Apr. n136; May n128
Eastern zinc mines modernize ....July *112
Electrothermic zinc plant expanded. ....Feb. 115
Vacuum dezincing adopted ....Feb. 115
Salero Metals ....Nov. n127
Salmon Gold ....Feb. n156
San Antonio Gold ....Jan. n121; Mar. n122; May n141; Aug. n122; Nov. n146
San Manuel Copper:
Our most promising copper area. W. P. Goss ....July *92
San Norm ....Aug. n122; Oct. n135
San Pedro ....Dec. n114
San Vicente Steel ....July n189
Santa Fe Pumice ....Nov. n139; Dec. n122
Santa Rita ....Apr. n144
Santiago ....Jan. n122; Feb. n164; May n144; June n129; July n184; Sept. n139
Saranac ....Apr. n132; Dec. n120
Sarita ....Oct. n121
Saskatchewan Minerals ....July n187
Schley ....July n172
Scraping (See Loading; also Haulage and Transport)
Senator-Rouyn ....Feb. n180; July n182
Seville ....May n127
**Shafts, installations and sinking:**
Labor saving, lower costs are prime objectives. A. H. Hubbell ....Mar. *68
Mucking Quemont's No. 2 shaft ....May *84
New bottom-opening skip for mine shafts ....Dec. *96
New mucker speeds incline sinking at Bunker Hill ....Aug. *69
Shattuck Denn:
Concentrator increases capacity ....July 118
Sheep Creek Gold ....July n184; Sept. n139; Oct. n138; Dec. n129
Sherritt Gordon ....Jan. n120; Feb. n161; Mar. n122; May n141; June n125; July n182; Aug. n122; Sept. n137, Oct. n135, Dec. n128
Sherwin Kelly Geophysical ....Oct. n143
Sherwood ....May n127
Sidney ....Mar. n114; Aug. n112
Costs cut with carbide bits at mine ....Mar. 67
Producer steps from small to major ....July *127
Sierra Madre ....Sept. n141
Silbak-Premier ....Mar. n134; May n142; Aug. n123; Sept. n138
**Silver:**
A better way to treat Parkes process crusts. Schlechten & Shih ....Oct. *80
Lucky Friday pays its way as it develops ore at depth ....July *126
Mexican band to market silver "barter coin" ....July *154
New mines from old. W. E. Scott, Jr. ....July *129
Production of silver 1948. D. H. Leaveus (chart & table) ....Feb. 73
Silver as money. Herbert Bratter ....Jan. 79

Silver Bell ..... Oct. n129
Silver Bounty ..... Aug. n123
Silver Bowl ..... Mar. n114; July n179; Aug. n112; Oct. n126
Silver Crescent ..... Mar. n114
Silver Dollar ..... Mar. n114; May n134; Sept. n123; Nov. n133
Silver Giant ..... Aug. n123; Dec. n128
Silver King Coalition ..... Apr. n126; Aug. n119; Sept. n131; Nov. n129
Silver King Consolidated ..... Oct. n132
Silver Mountain ..... June n124
Silver Ridge ..... Feb. n165; Mar. n124; Apr. n143
Silver Shield Mining & Milling ..... May n128; Oct. n122
Silver Standard ..... Jan. n123; Feb. n164; Mar. n124; Aug. n124; Sept. n140
Silver-Star Queens ..... Aug. n112
Silver Summit ..... May n134; June n118
Silver Syndicate ..... Jan. n111; Sept. n123
Silver Tip Gold ..... Mar. n124
Silversmith ..... Nov. n147
Silverton ..... June n119; Nov. n137
Simmer & Jack ..... June n133
Simplot Fertilizer ..... Mar. n114
How Simplot solved a complex stripping problem. H. B. Fowler .... Oct. *92
Western phosphate output soars .. July *130

**Sintering:**

Brazilian mine increases iron ore output by sintering ..... June *59
How mining men are using electronics today. J. A. Setter, pt. 3 ..... Sept. *85
Rotary-kiln nodulizing is simple, costs less. H. Berg ..... Aug. *56
Siscoe Gold ..... Jan. n120; Aug. n123
Siskiyou ..... Feb. n146
Skubic Bros. ..... Oct. n127
Sladen Malartic ..... Jan. n120
Slate River ..... Sept. n122
Slovak Magnesite Works ..... Mar. n131
Small Spot ..... Oct. n122; Dec. n115

Smelting:

Refractories cost money too ..... Dec. *74
Smithwick Concrete Products ..... Oct. n131
Snelling Gold Dredging ..... Oct. n121
Snowbird ..... Feb. n156; Nov. 127
Snow Lake Gold ..... Feb. n161
Snyder ..... Jan. n112; Feb. n152; June n110; Sept. n126
Sociedad Minera Puquio-Cocha .... Sept. n144
Societe Nord-Africaine du Plomb: Study in cooperation in production of lead and zinc ..... July *148

Societe des Mines de Zellidja: Study in cooperation in production of lead and zinc ..... July *148
Society Girl ..... Nov. n147
Socorro ..... Oct. n130
Solloway, I. W. C. & Associates .... Jan. n122
Sonoma Quicksilver ..... Nov. n129
Sons of Gwalia ..... Apr. n153; Nov. n153
South African Goldware to process gold ..... Apr. 105
South Agnew ..... Feb. n111; May n127; July n172; Aug. n114; Nov. n134
Skip hoist is remote-controlled ..... Dec. *82
South Kalgurli ..... Nov. n153
South Kalgurli Cons. ..... Mar. n134
South Platte Dredging ..... Mar. n118
South West Africa Co. ..... Mar. n129
Southeastern Mica ..... Mar. n109
Southeastern Mining Assn. formed .. Aug. 91
Southern Rhodesia ..... May n148
Southwest Metals ..... July n169
Southwest Potash ..... June n116; Dec. n121
Southwestern Chemical ..... Oct. n130
Sparga's Reward Gold ..... Aug. n127
Spider ..... Nov. n147
Spokane Cement ..... Dec. n126
Spokane-Idaho ..... Oct. n96
Spokane-Portland Cement ..... Mar. n116
Standard ..... Sept. n130
Stanley ..... May n127
Stanmac Ltd. ..... Feb. n161
Star Sherman ..... Apr. n171
Starrett Olsen Gold ..... Sept. n134

Steel:

"Steel expansion" bill seen as socialism ..... Mar. 87
Steep Rock Iron ..... July n180; Nov. n143
Export-import loan ..... Jan. 88
Stevenson ..... Oct. n127
Stillfontein Gold ..... Aug. n126

**Stockpiling:**

Billion earmarked for this year's stockpiling ..... June 87
Clear the confusion on stockpiling .. June 51
Large-scale, long-range stockpiling agency or revamped legislative mandate, sought by ECA ..... Jan. 89
The snarl in stockpiling means trouble for you. R. H. Ramsey ..... Sept. *72

**Stoping:**

Bunker Hill's new block-caving project to recover low-grade ore .. July *110
Cement floors in fill stopes ..... Sept. 96
Changed mining methods at Cerro's Cmbia mine ..... Apr. *92
Clevel-nd Cliffs combats rising costs. A. H. Hubbell ..... Nov. *96
Compressed-air unit for back-filling stopes ..... Oct. *101
Contour mining at Pend Oreille .. July *105
Ladder-mounted stopers simplify drilling. H. Leopold ..... June *94
Labor saving, lower costs are prime objectives. A. H. Hubbell .... Mar. *68
Mesabi is meeting higher underground costs. E. P. Pfeifer (charts & tables) ..... Nov. *100
Scraper and shovel operate together in stope ..... Selecting a stoping method to meet higher labor cost ..... Nov. 95
Some underground changes at the Holden mine. J. B. Huttl ..... Apr. *84
Tailings for stope filling at the Frood-Stobie mine ..... May *88
Strawberry ..... Feb. n146
Sub-Nigel ..... Jan. n132

**Subsidies:**

Compromise subsidy bill drafted .. June 86
Mine subsidy chances even slimmer ..... Sept. 98
Mine subsidy legislation—an editorial ..... Oct. 99
New substitute for Engle Bill .... May 102
Mine subsidy opposed by administration ..... Aug. 86
Why the O'Mahoney subsidy bill failed to pass the eighty-first Congress ..... Nov. 108
Sullivan .... Apr. n130; Sept. n122; Nov. n133
Electrolytic zinc plant to be expanded ..... Feb. 115
Sullivan Consolidated ..... Feb. n160

Sulphur:

Demand in 1948 ..... Feb. 95
Matsuo sulphur mine may become an open pit. P. C. Merrill ..... Jan. *72
Summit King ..... May n133
Sun Valley Silver-Lead ..... Aug. n113; Sept. n124; Dec. n118
Sungei Bidor Tin Dredging ..... Aug. n129
Sunset ..... Jan. n111; Apr. n126; Sept. n124
Sunshine ..... Mar. n114; May n134; Sept. n122; Dec. n131; Dec. n118, 120
Sunshine Cons. ..... Feb. n149; Apr. n131; June n118; Sept. n124
Sunshine Gold Development ..... Oct. n146
Sunshine Lardeau ..... Sept. n138; Nov. n147
Surigao Consolidated ..... Jan. n128; May n152; June n138; July n204; Sept. n145; Nov. n151

Sweden:

Mineral position of ECA nations. Geoffrey Smith ..... Mar. *78


## T


Tableland Tin Dredging ..... Oct. n146

Taconite:

Government aid looms for taconite plant ..... Sept. 99
Taisan Gold ..... Feb. n173
Taku River Gold ..... July n184; Aug. n124; Sept. n140
Takuapa Valley Tin Dredging .... Oct. n146
Talisman Mining & Leasing ..... Jan. n111; June n120; Nov. n142

Tariffs:

"San Francisco Plan" would divide metal tariff receipts among domestic producers ..... Sept. 102

Taxation:

Interior and treasury to exchange ideas on small mine operator's tax problems. Paul Leach Jr. ..... Oct. 98
Taylor All-Metals Concentrator .... Sept. n128
Taysan ..... Jan. n128; May n152
Te Aroha ..... Dec. n135
Telluride ..... July n169
Telluride Mines ..... Oct. n122
Tembladera Cement ..... July n192
Tennessee Coal, Iron & Railroad .... Oct. n120
Tennessee Schuylkill ..... Feb. n143
Thetford ..... May n140
Thomson Divide ..... Feb. n145; Nov. n129
Thurman Gold Dredging ..... June n121

**Timbering:**

Labor saving, lower costs are prime objectives. A. H. Hubbell ..... Mar. *68
Lake Shore Mines' timber-framing equipment. John Jamieson .... May *72
Timber handling eased ..... June 82
Timberline Milling ..... Apr. n125
Time and motion study exposes mining bottle-necks. Bitner & Mitchell .. Jan. *68

Tin:

Consumption and supply 1947-1948. Erwin Vogelsang (tables) ..... Feb. 81
Prices of lead, zinc, copper, tin 1920-48 (table) ..... Nov. 73
Tintic Standard ..... Aug. n120

**Titanium:**

The metal with a future ..... July *119
Office of Naval Research meet to discuss titanium ..... Feb. 124
Production in 1948. H. M. Meyer .. Feb. 89
Why the great interest in titanium? H. C. Cross ..... July *119

Titanium Alloy Mfg.:

Interest in titanium. H. C. Cross .. July 120
Togo ..... Aug. n120
Tombstone Development ..... June n115; Aug. n109
Tombstone Lode ..... Aug. n109
Tongkah Compound No. 3 N. L. .... Sept. n147
Tonopah Development ..... May n132
Tonopah Divide ..... Apr. n129; June n118; July n164; Oct. n129; Dec. n120
Toquepala ..... Mar. n128
Torbrit Silver ..... Jan. n122; Feb. n164; May n144; July n184; Sept. n140
Trail Smelter ..... Apr. n142
Trand Mining & Leasing ..... Sept. n122
Transcontinental Resources ..... Jan. n121

Tri-State Zinc:

Where new ideas made mines. Lyons, Heyl & Agnew ..... July *106
Triton Gold ..... Mar. n124
Troy ..... May n127
True Fissure ..... Nov. n146
True Grit ..... Feb. n146
Tsumeb ..... Jan. n132; Apr. n149
Africa aids an enterprise ..... July *150
Tuff Stone ..... Dec. n122
Tulameen Dredging ..... Oct. n140
Tulare County Tungsten ..... Sept. n130

Tungsten:

Cuba has potential tungsten mines. P. A. Bundy ..... Aug. *78
Production in 1948. H. W. Davis. Feb. 82
Tungsten Mining Corp. ..... Mar. n109
Infra-red heater lowers concentrate drying costs ..... Sept. *82

Tuolumne Gold Dredging:

Welding may cut your dredge maintenance costs. H. B. McGuire .... Sept. *80
Twin-J ..... Mar. n124
Tyee ..... Mar. n124


## U


Unicorn ..... Jan. n123
Union ..... May n149
Union Oil ..... Apr. n124; Aug. n110
Union Platinum ..... Mar. n130
United Keno Hill ..... Apr. n144; July n187; Aug. n126
U. S. Atomic Energy Comm. ..... Jan. n112

U. S. Bureau of Mines:

Decentralizes control of affairs .. Sept. *99
U. S. Coal & Coke ..... July n172
U. S. Gold ..... Apr. n132; July n175
U. S. Grant .. May n135; July n175; Nov. n137
U. S. Gypsum ..... May n136
U. S. Potash ..... Apr. n127
Carlsbad potash industry expands. Jack Pierce ..... July *135
U. S. Smelting, Refining & Mining ..... Jan. n114; Mar. n118; June n123; Aug. n108, 119; Sept. n131; Oct. n120
How U. S. Smelting attacks problem of cost reduction ..... Nov. 80
U. S. Steel ..... Apr. n104
Ore in Brazil and Venezuela inspected ..... Jan. 88
U. S. Vanadium ..... Jan. n112; June n113; July n165; Nov. n130
Uranium—a job for mining men. July *136
Upper Canada Gold .... Sept. n134; Oct. n137

**Uranium:**

Can uranium mining pay? A. W. Knoerr ..... Dec. *64
Colorado Plateau uranium mining ..... Sept. *104
Uranium—a job for mining men. July *136
Well drillers find uranium in Italy ..... Sept. 101
Uranium Co. ..... Feb. n144
Utah Construction ..... Dec. n124
Utah Copper ..... Apr. n125; May n130
Utica ..... Jan. n123; Mar. n124; Sept. n140


## V


Vaal Reefs Exploration & Mining ..... Mar. n129; Dec. n132
Valentine ..... Oct. n122
Van Dyk Cons. ..... June n134; Dec. n132
Van Roi ... Apr. n142; June n127; Aug. n123
Vananda ..... Nov. n143
Vanadium ..... May n129
Vanadium Co. ..... Nov. n127
Vanadium Corp. ..... Jan. n112; Feb. n140; Apr. n126; June n114; July n166; Aug. n109; Nov. n130
Uranium—a job for mining men. July *136
Vancouver Island Base Metals ..... June n128; Oct. n138

Venezuela:

Iron ore from El Pao for Bethlehem ..... Aug. *70
Location of iron exploration and mining projects ..... July *90
Venterspost Gold ..... Feb. n171

Ventilation:

The carbon monoxide hazard. R. W. Thompkins ..... Sept. *76
How fans in series cut ventilation costs ..... Aug. *66
Venturies, Ltd. ..... Sept. n136

Vermiculite:

Laboratory furnace for vermiculite and perlite tests ..... Dec. *139
Vermont Marble ..... Oct. n120
Vicar ..... Mar. n112; May n127; July n173


e editorial; n news; c comment and criticism; * illustrated

Village Main Reef .....Dec. n132
Vindicator Silver-Lead .....Nov. n134
Violamac .....June n128
Virtue .....Sept. n130
Vitoria-Minas .....May n147
Vogelstruisbult Gold .....June n133; Sept. n152
Vulcan .....Aug. n113

## W

Wabana .....Aug. n121
Wade .....May n127
Waite Amulet .....July n182; Sept. n135
Waite Minerals .....June n120
Walkom Gold .....Mar. n130
Wanless-Woodbridge .....July n172
Warner .....May n126
Washington-Idaho .....Oct. n125
Water alarm .....May *110
Wattle Gully .....June n136

Welding:
Mine rails welded may mean better haulage .....Oct. *102
Welkom ....May n149; July n195; Sept. n150
West Driefontein .....Apr. n148; June n134; July n194; Dec. n132
West Wits .....July n193
West Witwatersrand Areas .....Feb. n171
Western Alluvials .....Sept. n146
Western Arizona Metals .....Jan. n114
Western Exploration .....Sept. n141
Western Gold Dredging .....Aug. n118
Western Holdings .....Apr. n148; July n195; Sept. n150; Dec. n132
Western Light Metals .....Feb. n148
Western Perlite .....Nov. n127
Western Reefs Exploration & Development .....Mar. n129
Western Uranium-Cobalt .....Sept. n138; Oct. n140
Westland .....Jan. n120
Westvaco Chemical .....Feb. n149
Westville .....Aug. n122
Whinnery .....Nov. n129
Whitedalf .....Feb. n149
Whitewater .....Aug. n124
Wildee .....Aug. n110
Wilfley Leasing & Mining .....Feb. n145
Winnipeg River Tin .....Nov. n145
Winslow .....Sept. n136 Nov. n147

Witwatersrand:
"Safety first" on the Rand pays dividends. J. M. Lawless .....Apr. *94
Wright-Hargreaves .....May n120
Acid removes lime coating on filters .....Apr. *108
Clocks indicate interruption of ball mill feed .....May *112
Internal air jets clean pulverizer safely .....Sept. *108
Sprayer breaks down mill froth...June *96

## Y

Yadkin Mica & Ilmenite:
Mining titanium .....July 123
Yale Lead & Zinc..Mar. n124; Apr. n142; June n128; July n185; Sept. n140; Dec. n128
Yankee Girl .....Feb. n149
Yarnell Consolidated .....Jan. n113
Yellow Pine .....Apr. n132
Yonki Creek Gold .....Oct. n146; Nov. n154
Young America .....Aug. n120
Yuba Consolidated .....July n165; Oct. n121
Yuba Consolidated Goldfields .....Feb. n145; Mar. n117; Sept. n121, 141
Yucca .....June n115
Yukon Consolidated Gold .....Jan. n124; July n187; Aug. n128
Yukon Gold Placers .....Jan. n124; July n187; Aug. n108; Oct. n120

## Z

Zimmerman .....Aug. n115

Zinc:
Aguilar participates in new projects .....July *147
A better way to treat Parkes process crusts. Schlechten & Shih .....Oct. *80
Eastern zinc mines modernize ....July *112
Exports and imports—U. S. slab zinc statistics 1941-1948. C. R. Ince (chart & table) .....Feb. 79
Galena-Platteville area in Mississippi Valley where new ideas made mines. Lyons, Heyl & Agnew .....July *106
Impoverishment of ores 1939 and 1947 (table) .....Nov. 75
Lead and zinc ore grades and costs 1935-47 (table) .....Nov. 75
The Metaline mining district. W. L. Zeigler .....July *102
New Jersey Zinc develops a new condenser. Bunce & Peirce .....Mar. *56
New orebodies help raise Arizona's lead-zinc output. E. D. Wilson ..July *116
Prices of lead, zinc, copper, tin 1920-48 (table) .....Nov. 73
Sidney mine steps up from small to major producer .....*127
Tsumeb Corp., Ltd., now operating a reopened lead-zinc property ...July *150
Zellidja—study in cooperation in production of lead and zinc .....July *148
Zinc. Corp. .....Nov. n154
Zincton .....June n128

Zirconium:
Metallic zirconium under development .....June 87
Zonolite .....July n175; Sept. n128
Zuni Milling .....Apr. n127; July n162

# INDEX TO AUTHORS

**Authors:**


Agnew, Allen F., E. J. Lyons & A. V. Heyl Jr.—Where new ideas made mines ..... July *106
Andersen, L. M.—Crushing plant design, pt. 1, ..... Oct. *94; pt. 2, Dec. *85

Barker, Clarence S., C. A. Fitch Jr. & James Quigley—Utah's new mining district ..... Mar. *63
Benitez, Fernando—Improved handling cuts nitrate industry's costs ..... Oct. *90
Bennett, Russell H.—A decade of electrolytic manganese ..... Oct. *50
Berg, H.—Rotary-kiln nodulizing is simple, costs less ..... Aug. *56
Bitner, A. Wayne & D. R. Mitchell—New time-study method exposes mining bottlenecks ..... Jan. *68
Bitzer, E. C. & H. H. Vogel—Shift to new separator cuts garnet milling costs ..... Aug. *62
Boericke, William F.—Postwar operating costs higher in the Philippines .. Sept. *94
Bratter, Herbert—How profitable is gold mining? ..... Mar. *76
Silver as money ..... Jan. 79
Could the treasury raise its gold price overnight? ..... Dec. 72
Brewster, Frederick R.—Great Britain ..... Jan. *61
Bunce, E. H. & W. M. Peirce—New Jersey Zinc develops a new condenser ..... Mar. *56
Bundy, Paul A.—Cuba has potential tungsten mines ..... Aug. *78

Carman, J. S.—The bush and I .... June *78
Clark, W. B. & Lester Hanson—Mine power through 44,000-v gas-filled cable ..... Aug. *60
Cross, H. C.—Why the great interest in titanium? ..... July *119

Davis, Franklin T.—For lower-cost regrinding ..... Oct. *85
Davis, Hubert W.—Cobalt ..... Feb. 88
Molybdenum ..... Feb. 92
Nickel ..... Feb. 91
Platinum-group metals ..... Feb. 88
Tungsten ..... Feb. 92
DeMille, John B.—Canada's future brightens as producer of iron ore.. Apr. *90

Eldridge, Douglas H.—Is use of Hoskold formula justified? ..... Aug. *72

Fitch, Cecil A. Jr., James Quigley & C. S. Barker—Utah's new mining district ..... Mar. *63
Fowler, Heath B.—How Simplot solved a complex stripping problem ..... Oct. *92

Gahl, E. A.—How to get better service out of V-belts ..... Aug. *95
Gambatese, Joseph M.—Communists still threaten metal-mine labor relations ..... Apr. *68
Gardner, E. D.—Unique equipment helps in cutting shale mining costs .... Nov. *92
Gaudin, A. M.—Charles E. Locke obituary ..... Jan. *108
Gibson, Swanton—Modern mine dry. Sept. *88
Goss, Wesley P.—Our most promising copper area ..... July *82
Gustavson, Samuel A.—Antimony ..... Feb. 87
Beryllium ..... Feb. 86
Bismuth ..... Feb. 87

Haffner, J. B.—Bunker Hill modernizes mine, mill and smelter ..... July *109
Hanna, M. A.—Transport capacity in freezing weather ..... Aug. 80
Hanson, Lester & W. B. Clark—Mine power through 44,000-v gas filled cable ..... Aug. *60
Hanvey, J. T. Jr.—Infra-red heater lowers concentrate drying costs .... Sept. *92
Head, James L.—Charles E. L. Arnold ..... May 124
Heyl, Allen V. Jr., E. J. Lyons & A. F. Agnew—Where new ideas made mines ..... July *106
Honeyman, P. D. I.—Inspiration .... July *95
Houston, Charles C.—H. Clare Horwood ..... Jan. 108
Howat, Dr. David D.—Britain gets half its iron from its lean ores ..... June *66
Britain's iron mines also have their problems ..... May *74
Hubbell, A. H.—Changing practice favors reduction of breaking cost ..... Nov. 88
Cleveland-Cliffs combats rising costs ..... Nov. *96
Labor saving, lower costs are prime objectives ..... Mar. *68
Mining industry watches drilling outcome ..... Feb. *96
Hughlett, Lloyd J.—Getting at Itabira's iron ..... Oct. *76
Hurley, Patrick M.—Airborne magnetic survey in Maine ..... Aug. *52
Hutti, John B.—Aluminum dredge designed for difficult placer job .... Apr. *72
Diatomite: its mining and processing ..... Aug. *75
Eagle Mountain, new source of iron ore for Fontana ..... May *92
Mechanized drifting speeds development work ..... Jan. 67
Some underground changes at the Holden mine ..... Apr. *84

Ince, Charles R.—Zinc ..... Feb. 79

Jager, Fritz W.—Driving a prospect tunnel ..... July *134
Jamieson, John—Mechanical equipment speeds timber framing ..... May *72
Jones, W. E.—A safety program can also curb costs ..... Nov. *86

Keehn, R. W.—Charleston lean-ore plant to treat old stockpile ..... Apr. *80
Kennard, Max J.—Save time, cut costs in unloading ore ..... Aug. *59
Klepetko, Ernest.—Making resin from coal ..... Jan. *81
Klover, E. J.—How you can predict product screen analyses ..... June *80
Knoerr, A. W.
Can uranium mining pay? ..... Dec. *64
Krebs, Richard & J. C. O'Donnell—Sand-slime stope filling proves satisfactory ..... Jan. *54
Kriz, M. A.—Gold ..... Feb. 70

Lawless, J. M.—"Safety first" on the Rand pays dividends ..... Apr. *94
Leach, Paul Jr.—Interior and treasury to exchange ideas on small mine operator's tax problems ..... Oct. 98
Leavens, Dickson H.—Silver ..... Feb. *73
Legsdin, A. & F. L. Schenck—To rate grinding efficiencies ..... Apr. *88
Leopold, H.—Ladder-mounted stopers simplify drilling ..... June *94
Lund, Richard J.—Light metals .... Feb. 83
Lutjen, G. P.—Another step in jet piercing ..... Aug. *64
Lyons, Erwin J. A. V. Heyl Jr. & A. F. Agnew—Where new ideas made mines ..... July *106

Malozemoff, Plato—The real danger of high costs ..... Nov. *72
Maury, Jesse L.—Letter ..... Jan. 107
Mazzucchelli, Fedele—Italy's mining problem ..... June 104
McGuire, H. R.—Welding may cut your dredge maintenance costs ..... Sept. *80
Melcher, Norwood R.—Chromite ..... Feb. 91
Manganese ..... Feb. 90
Merrill, Charles W.—Ferro-alloy metals ..... Feb. 90
Minor metals ..... Feb. 86
Merrill, Pomeroy C.—Matsuo sulphur mine may become an open pit .... Jan. *72
Meyer, Helena M.—Mercury ..... Feb. 87
Titanium ..... Feb. 89
Mitchell, David R. & A. W. Bitner—New time-study method exposes mining bottlenecks ..... Jan. *68
Morton, W. R.—Power rectifiers for mines ..... May *78
Mote, Richard H.—Cadmium ..... Feb. 89

Newmeyer, Charles E.—Denver meeting of Colorado Assn. features gold, uranium mining ..... Mar. *90
Neyman, R. W.—Cost cutting at Star mine helped by many factors .... Nov. *80

O'Donnell, J. C. & Richard Krebs—Sand-slime stope filling proves satisfactory ..... Jan. *54

Page, W. C.—What is the total cost of day's pay labor? ..... May *85
Peirce, W. M. & E. H. Bunce—New Jersey Zinc develops a new condenser. Mar. *56
Pfeifer, E. P.—Meeting higher underground costs on the Mesabi .... Nov. *100
Pierce, Jack—Carlsbad potash industry expands ..... July *134

Quigley, James, C. A. Fitch Jr. & C. S. Barker—Utah's new mining district ..... Mar. *63

Ramsey, R. H.—General advance marks all fields in milling ..... Feb. *106
The snarl in stockpiling means trouble for you ..... Sept. *72
Reid, J. A.—David Rhys Thomas .. May 123
Reinhardt, Elmer V.—Can a study of topography locate undiscovered mineralized areas? ..... Sept. *90
Richardson, James K.
Mining's labor relations gives no cause for pride ..... Dec. *78
Riker, O. Perry—Greece ..... Jan. *65
Romberg, Frederick—Gravity meter survey leads to ore discovery ..... Mar. *52
Runner, D. G.—Non-metallics ..... Feb. 93

Schenck, Frederick L. & A. Legadin—To rate grinding efficiencies ..... Apr. *88
Schlechten, A. W.—Non-ferrous metallurgy shows advances ..... Feb. *112
Schlechten, A. W. & C. H. Shih
A better way to treat Parkes process crusts ..... Dec. *80
Scott, Walter E. Jr.—New mines from old ..... July *129
Setter, J. A.—How mining men are using electronics today, pt. 1 ..... ..Apr. *76; pt. 2 June *72; pt. 3 Sept. *84
Shih, C. H. & A. W. Schlechten
A better way to treat Parkes process crusts ..... Dec. *80
Smith, Geoffrey—Sweden ..... Mar. *78
Solem, Arne—Norway ..... Mar. *82
Stahle, Alfred M.—Today's triple challenge to the engineer ..... June *52
Stigzelius, Herman—Finland ..... Mar. *83
Stirrett, J. R.—Klondike gold rush recalled ..... Feb. 178
Strong, Remer—Cooking at 14,000 feet ..... Aug. *66
Sun, Shiou-Chuan—Analyzer aids electrostatic research ..... May *90

Thompkins, R. W.—The carbon monoxide hazard ..... Sept. *76
Thompson, J. W.—Hollinger's wage incentive ..... Nov. *82
Tillinghast, E. S.—Let's get more good men for mining ..... May 82
Tyler, Paul M.—Modernizing dry kaolin milling in South Carolina ..... June *56

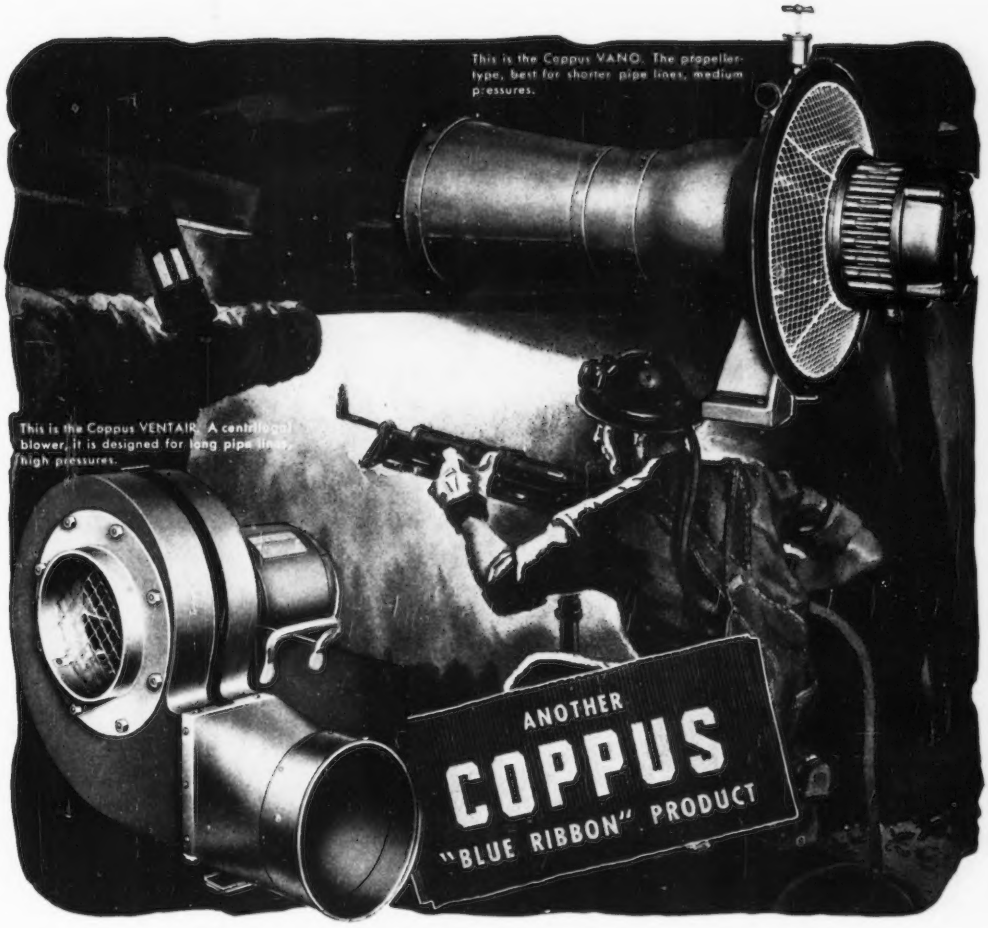
Van Horn, Earl C.—New barite possibilities revealed in the Carolinas .... Jan. *76
Vogel, H. H. & E. C. Bitzer—Shift to new separator cuts garnet milling costs ..... Aug. *62
Vogelsang, Erwin—Tin ..... Feb. 81

Wanders, H. H.—Copper ..... Feb. 75
Waylett, William J.—Self-illuminated backsight aids mine surveyors .. June *65
Williamson, J. E.—A rapid determination for calcium ..... Mar. *75
Wilson, Eldred D.—New orebodies help raise Arizona's lead-zinc output .. July *116
Wright, Charles Will—Metals for the future ..... May *94
Wuerker, Rudolph G.—Sedimentary strata experience can aid in rockburst study ..... June *60

Yu Wang, Dr. Chung—Calculating charges for the precipitation method of antimony smelting ..... Mar. 67

Zeigler, W. L.—The Metalline mining district ..... July *102
Ziegfeld, Robert L.—Lead ..... Feb. 77


e editorial; n news; c comment and criticism; * illustrated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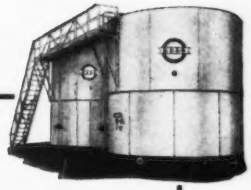

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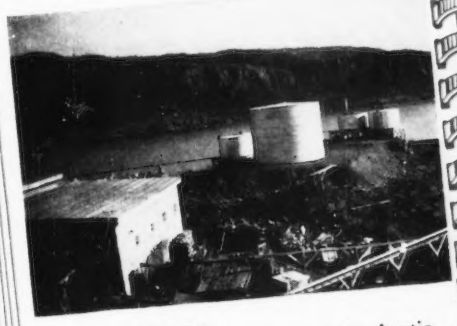

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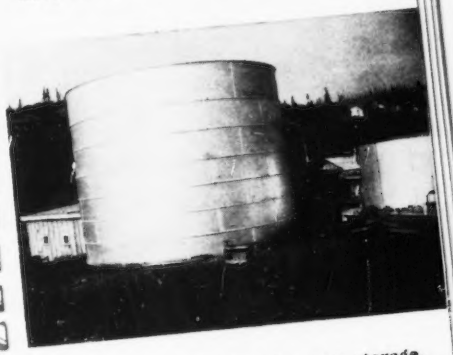

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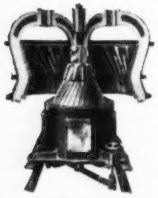

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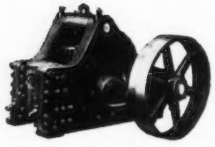

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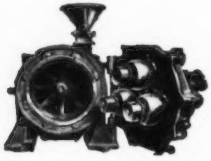

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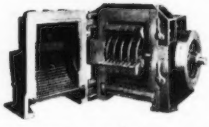

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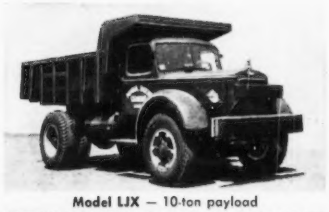

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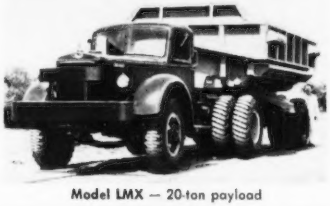
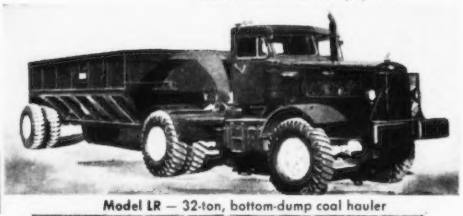


Model LMX — 20-ton payload

Model LRSW — 30-ton payload



Model LR — 32-ton, bottom-dump coal hauler

IT'S PART OF THE LANGUAGE:

*Built Like a* **Mack** *Truck*

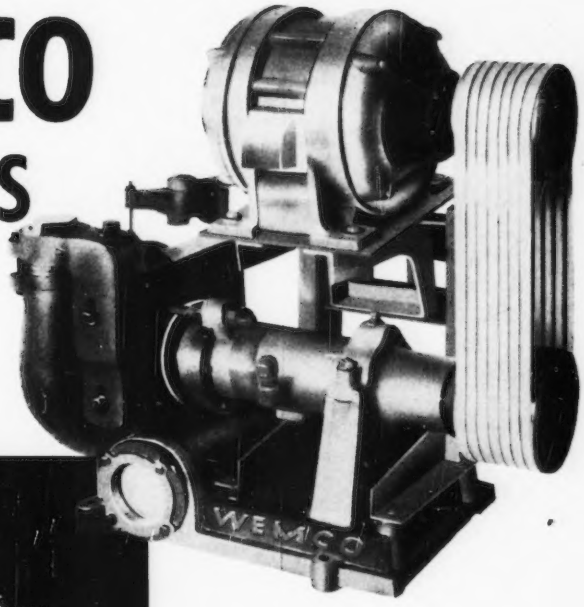
Model LRSW tractor — 50-ton payload

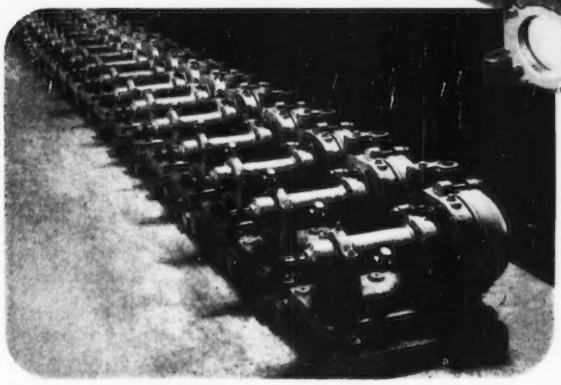
Mack Trucks, Inc., Empire State Building, New York 1, New York. Factories at Allentown, Pa.; Plainfield, N. J.; New Brunswick, N. J.; Long Island City, N. Y. Factory branches and dealers in all principal cities for service and parts. In Canada, Mack Trucks of Canada, Ltd.

# HIGHER COEFFICIENT OF *PRODUCTION*

## with WEMCO SAND PUMPS

Full-capacity operation with fewer shutdowns explain why WEMCO Sand Pumps outperform, *outproduce* pumps of less advanced design.



**IMMEDIATE DELIVERY**

**WEMCO Sand Pumps and parts are available for immediate shipment from all WEMCO warehouses. For prompt service or price quotations, call the WEMCO office nearest you.**

The advanced design and simple construction of WEMCO Sand Pumps assure dependable, heavy duty operation with minimum interruption in service. Moulded rubber or special alloy metal wearing parts, close tolerances, centrifugally sealed pumping compartment, heavy duty bearings, and specially designed open impellers combine to give superior performance under the most rugged conditions.

For handling pulps containing coarse sands, gritty solids, slimes, slurries, and heavy density media, WEMCO Sand Pumps provide high production at low cost. Available in sizes 2", 3", 4", 6" and 8" discharge diameter.

***PRINCIPAL OFFICES***

Los Angeles • Sacramento • Salt Lake City • Spokane
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A. Schubarth & Company, Basle, Switzerland
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**WEMCO**
**WESTERN MACHINERY COMPANY**
760-766 FOLSOM STREET · SAN FRANCISCO 7, CALIFORNIA

WKE (HMS) Mobil-Mill • Coal Spiral • Standard Thickeners (HMS) Thickeners • (HMS) Media Pumps • Hydroseparators (HMS) Densifiers • (HMS) Separatory Cones • "SH" Classifiers Sand Pumps • Conditioner and Agitators • Fagergren Flotation Machines • Dewatering Spirals • (HMS) Laboratory Units

## *Here's the New* GARDNER-DENVER

# Hydraulic Drill Jumbo

### *for the fastest round you ever drilled!*

**FASTER setup**

—No columns to place—no cumbersome blocking to handle.

**FASTER from hole to hole**

—Enables operator to spot each new hole quickly —right where the shot will give best breakage.

**FASTER tearing down**

—Release hydraulic pressure and the jumbo and drills are "on the way" to another heading.

These versatile, labor-saving Gardner-Denver Hydraulic Drill Jumbo units will increase your daily footage—will lower your drilling costs per foot—will give you faster, properly drilled rounds.

**a jumbo for every job**

Complete truck mounted jumbos are made with one, two or three drill booms and a roof jack unit, as shown. For special job requirements and large tunnel headings, equip your own jumbo carriage with Gardner-Denver hydraulic boom and roof jack units. They're available separately, in various lengths.

**handle up to 10-foot steel changes**

Versatile Gardner-Denver Jumbos may be furnished with chain feeds for 6-, 8- or 10-foot steel changes—enable you to take full advantage of modern tungsten carbide bits. Automatic screw feed guide shells accommodate steel changes up to five feet.

**Other advantages of Gardner-Denver ADVANCED DESIGN**

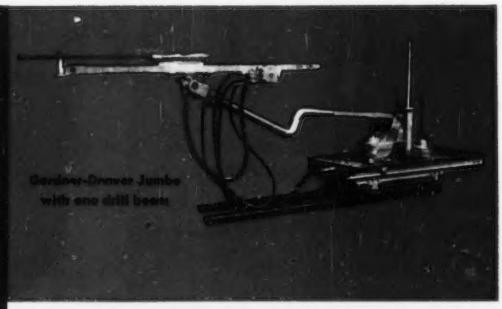
*"Creep-free" Booms* — **right angle application of hydraulic piston pressure holds booms steady and true.**

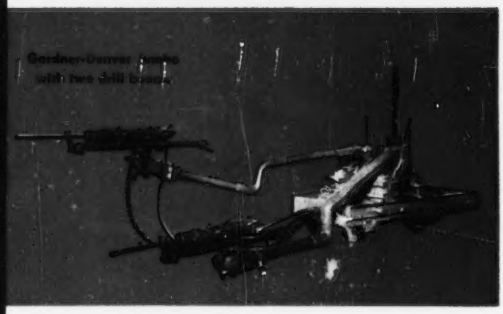
*Offset Booms* — **reach lifters easily — without swinging the drill under.**

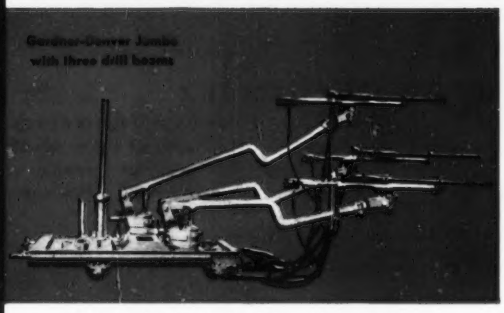
*Positive Hydraulic Roof Jack* — **holds truck stationary while drilling the round.**

*Closed Hydraulic System* — **low pressure type — any leakage past piston remains in the system.**

*Choice of Hand or Automatic Hydraulic Pump* — **Each boom or roof jack unit may be operated by its own hydraulic hand pump — or all units on a jumbo may be operated by a central, automatic, air motor driven hydraulic pump.**




*Write today for further information on the new Gardner-Denver Hydraulic Drill Jumbo Units.*

GARDNER-DENVER
Since 1859

Gardner-Denver Company, Quincy, Illinois
In Canada: Gardner-Denver Company (Canada), Ltd., Toronto, Ontario

# Get this Bonus...

50 to 100% longer tire life..
Reduced road maintenance

*along with*

## increased tonnage and lower hauling cost!

WHEN you put Walter Tractor Trucks on your pit run, you soon discover money-making "extras" found in no other truck . . . resulting from the great power and super traction of the Walter 4-Point Positive Drive.

Your first discovery is the extra tons delivered, because you haul 40-ton payloads per trip and make more trips per shift. Walter Tractor Trucks haul huge loads at good speeds, climb steepest grades, maneuver easily and quickly at shovel and dumping point, which permits more hauling cycles per hour.

You next discover extra days of production in bad weather and difficult running conditions, because Walter Tractor Trucks continue hauling when other trucks are stopped. You further discover that your Walter Tractor Trucks stay on the job and out of the repair shop; that your roads stay in good condition; that your tires show much less wear.

### LONGER TIRE LIFE — LESS ROAD DAMAGE

With the smooth, positive traction of the Walter 4-Point Positive Drive, there is never wheel spinning to grind tires and gouge roads. Secondly, the Suspended Double Reduction Drive reduces unsprung weight permitting tires to follow the contour of depressions and bumps without losing contact. This cuts down the bouncing, pounding and overheating of tires and is easy on mine roads. Many mines report 50 to 100% longer tire life through this Walter feature.

• Walter Tractor Trucks are proved by years of outstanding records in iron and coal mines. Learn more about these "extras" by writing for new folder "Walter Tractor Trucks for Tonnage Hauling."

**WALTER MOTOR TRUCK CO.**, 1001-19 Irving Ave., Ridgewood 27, Queens, L. I., N. Y.

**WALTER**
**TRACTOR TRUCKS**

# TWELVE HUNDRED HANDS TO FIND THE FACTS

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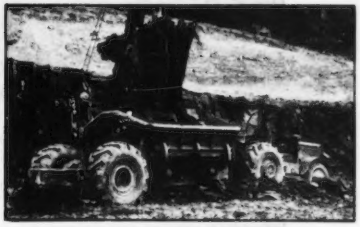
HEADQUARTERS FOR INDUSTRIAL INFORMATION

# Side-Dump Euclids DO A WIDE RANGE OF WORK

- MINES
- QUARRIES
- CONSTRUCTION
- INDUSTRIAL

**High speed is maintained with a load of 12.8 bank yards of heavy excavation at an airport job in Tennessee.**



**Low, wide hopper speeds loading and reduces spillage at an open-pit coal mining operation in West Virginia.**

THE Side-Dump Euclid is a versatile hauling unit with a wide range of usefulness on the toughest off-the-highway jobs. Its big trailer body assures easy loading and has a capacity of 20 tons . . . a 200 h.p. diesel engine provides speed and power for high production at low cost.

Euclid twin hydraulic hoists raise the body and its 40,000-lb. payload fast . . . down-folding gates open automatically when the body is raised . . . either right or left dumping can be selected by the operator. High dumping angle and smooth interior assure fast, non-stop shedding of loads over the edge of fills and waste banks or in even windrows on the fill.

The Side-Dump Euclid is engineered as a complete unit and is ruggedly constructed for hauling rock, ore, overburden, and other heavy excavation. The big 24.00 x 25 tires on drive and trailer wheels give good flotation and traction on soft fills and difficult haul roads.

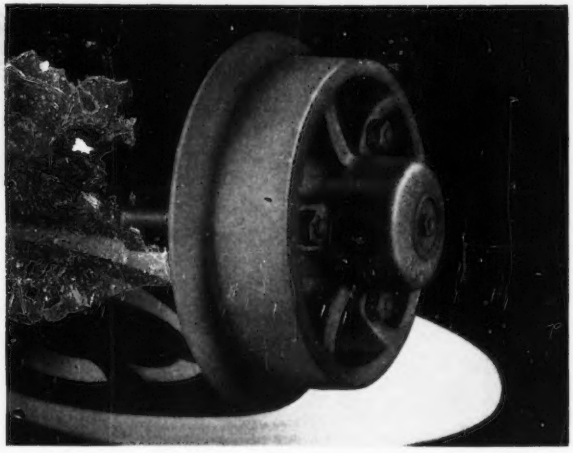
Your Euclid Distributor will be glad to discuss the many advantages of Side-Dump Euclids for your off-the-highway hauling jobs . . . call or write today.

**The EUCLID ROAD MACHINERY Co.**
CLEVELAND 17, OHIO

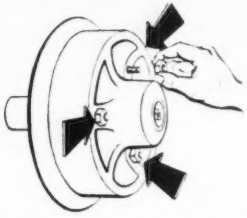
## you get top performance..

# Less Maintenance

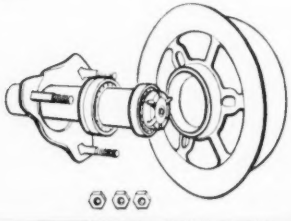
## ...with S-D "FLOATERS"!



**QUICK DEMOUNTABILITY SAVES HOURS OF MAINTENANCE TIME**



Shown by arrows above are the three nuts that hold the S-D "Floater" in position. To demount the "Floater" remove the three nuts and the wheel slips off (as shown below). Bearings are held in perfect adjustment on the axle by the retaining nut on the end of the axle.



The S-D "Floater" is one mine car wheel that gives you top performance in the mine at rock bottom maintenance cost. Smooth-rolling S-D "Floaters" are stacking up performance records all over the country. According to independent engineering tests, they have, in some instances, increased the net loads hauled by locomotives as much as 50% over other types of precision bearings—a tremendous saving in power. When it is necessary to demount a wheel, an unskilled worker can do the job as quick and easy as removing an automobile wheel, saving hours and dollars in maintenance. In addition, the "Floater" solid front hub and double back seal eliminates grease leakage . . . one greasing in five years is usually sufficient . . . this is lubrication cost at its lowest point. The "Floater" principle of one set of bearings which "float" into perfect adjustment eliminates pinching, mis-alignment, loose or tight bearings. That's why we guarantee "Floaters" against bearing failure for five years. Write today for folder 7105.

*20 Car loads of "Automatics" from—*

**SANFORD-DAY IRON WORKS, Inc. Knoxville 9, Tenn.**

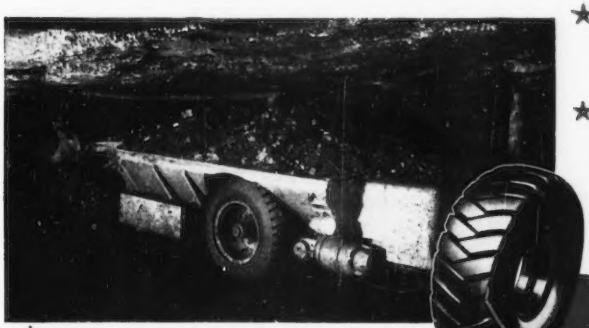
# OVER SHARP ROCKS, DEEP RUTS, MUD, SLUSH AND GRAVEL, *Generals* MOVE HEAVY LOADS OUT AND OVER THE HIGHWAY

## *Faster, Cheaper, Safer*

Here's the answer to your tire problems. Two great General tires built to take bruising punishment on jagged strip mine roads. The *General L. C. M.* for trucks that work 80% in the stripping area—20% on the highway. The *General H. C. T.* for some work off the road—most work over the highway. A dual-purpose team to answer important hauling problems in your mining operation. More mileage, longer wearing, double-duty tires that mean big savings in time, labor and money to you.

★ **L.C.M.**—Extremely thick, tough tread cushions tire surface against snags and cuts. Tremendous self-cleaning shoulders throw off mud and rocks, while deep cleats develop powerful traction.

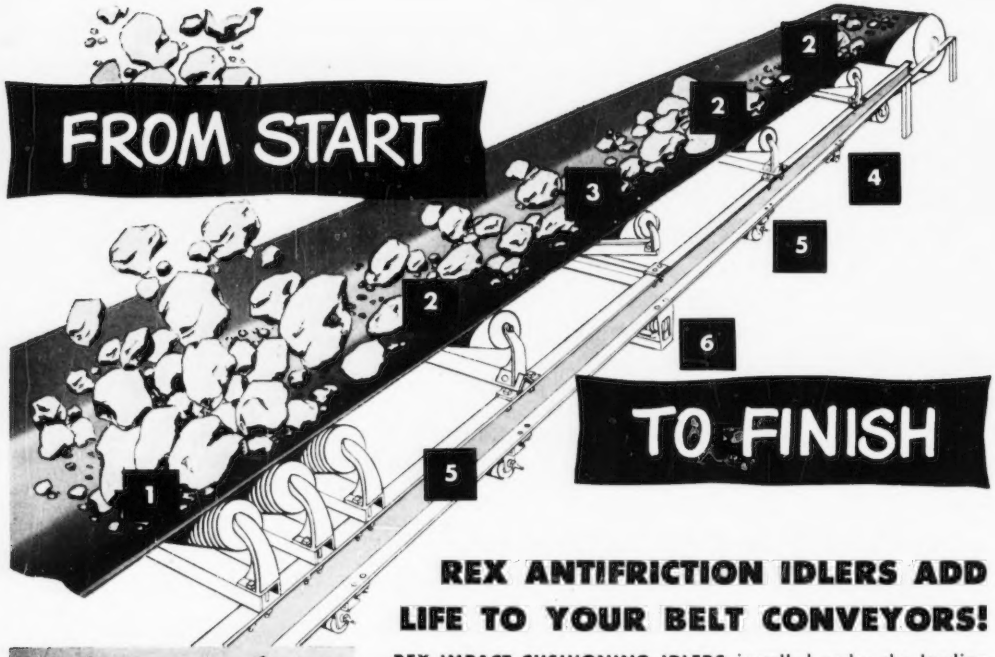
★ **H.C.T.**—Double-thick, tough tread. Greater blowout protection. Extra deep tread grooves develop extra traction through mud, slush and gravel . . . prevent slipping and spinning.



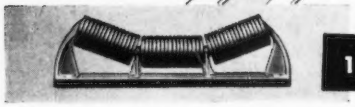
★ General's new underground mining tire with extra wide, extra deep tread. Tremendously thick sidewalls for extra protection; many extra hours of wear under punishing conditions. Easier steering, more traction.

The GENERAL TRUCK TIRE

THE GENERAL TIRE & RUBBER CO., AKRON, OHIO

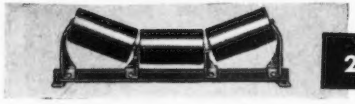



# REX ANTIFRICTION IDLERS ADD LIFE TO YOUR BELT CONVEYORS!



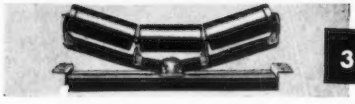
1

**REX IMPACT CUSHIONING IDLERS** installed under the loading points will take the bumps for your belts . . . minimize ruptures and lacerations. Dual-purpose rubber rolls are scientifically molded with deep primary grooves for maximum cushioning and secondary grooves that provide surface softness to avoid belt laceration.



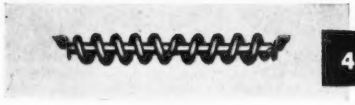
2

**REX TROUGHING IDLERS** insure minimum service cost and maximum equipment life. Belt friction wear is practically eliminated, and the closely spaced, well-balanced roll units provide an idler assembly that is kind to the belt. There is a type and style for every application.



3

**REX SELF-ALIGNING TROUGHING IDLERS** automatically align belts without the need for side-guide idlers that impose excessive belt edge wear. They eliminate the misalignments caused by off-center loading, side-wind drifting, warped frames or uneven belt stretch. These idlers fit any belt conveyor frame.

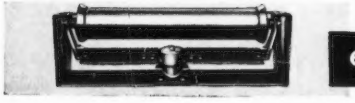


4

**REX RUBBER-COVERED SPIRAL RETURN IDLERS** create an ever-changing point of contact between belt and idler. Ice, abrasive, corrosive and sticky material cannot build up on the idler and cause premature wear and operating difficulties.

5

**REX RETURN IDLERS** are dead or live shaft type idlers with hydraulic type fittings for high pressure grease lubrication. They are sturdily built, and their smooth-rolling action cuts belt wear to the minimum.

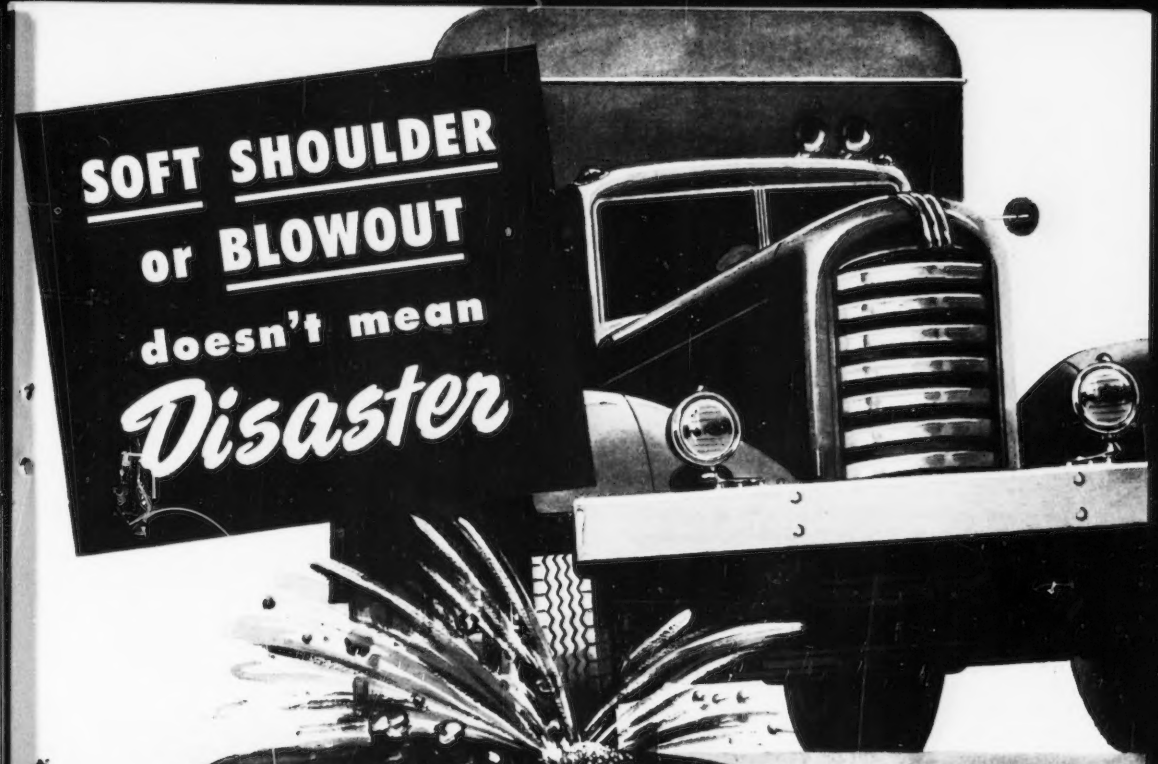


6

**REX SELF-ALIGNING RETURN IDLERS** assure automatic belt alignment on the return run. They are similar in general design and effectiveness to the Rex Self-Aligning Troughing Idler.

**For complete details on these and the many other idlers in the complete Rex line, write for your copy of Bulletin 463-R. Chain Belt Company, 1679 West Bruce Street, Milwaukee 4, Wisconsin.**

CHAIN BELT COMPANY REX BELT CONVEYOR IDLERS



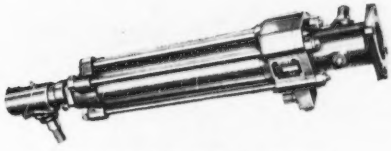

# When You Have VICKERS Hydraulic POWER STEERING

There's less hazard when forced off the road onto soft, rocky, rutted or snow banked shoulders . . . when you have Vickers Hydraulic Power Steering. The steering mechanism is hydraulically locked against any road condition reaction. The vehicle can't swerve from road reaction. There's no "wheel fight" to wrench the steering wheel out of the driver's hands. Pull-back onto the road requires only a trigger-pull on the steering wheel.

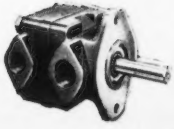
Vickers Hydraulic Power Steering is safer . . . effortless . . . provides hydraulic power at instant command of the driver to meet any steering requirements. This extra-quick steering increases the ability to maneuver in emergency. The driver is less tired, more alert.

Vickers Hydraulic Power Steering can be used as original equipment, or adapted to most trucks and other vehicles now in service. Write for Bulletins 47-30 and 49-52 covering further details and specifications.

VICKERS
**HYDRAULIC POWER STEERING**
*is Effortless, Positive, Shockless*



Vickers Hydraulic Steering Booster with Integral Overload Relief Valve. Bulletin 47-30a.



Vickers Balanced Vane Type Pump is Engine Driven. Bulletins 36-12 and 49-52.

**VICKERS Incorporated**
*DIVISION OF SPERRY CORPORATION*
**1405 OAKMAN BLVD. • DETROIT 32, MICH.**

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*ENGINEERS AND BUILDERS OF OIL HYDRAULIC EQUIPMENT SINCE 1921*

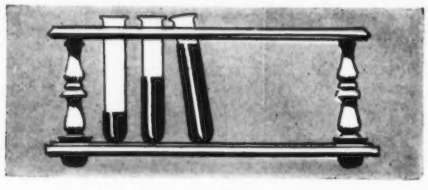
# The Famous Purple* Oil

# T5X

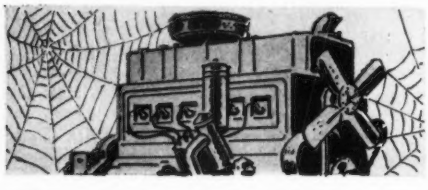
## MEANS OUTSTANDING ENGINE PROTECTION!

**T5X** gives greater protection to *any* internal combustion engine in *any* industrial operation! Here are the reasons why: FIRST, T5X is a highly refined, 100% pure, paraffin-base oil obtained from the highest quality base stocks.

**SECOND,** T5X contains a detergent compound that retards sludge formation to a remarkable degree. Thus, oil lines, ring grooves and pistons stay clean longer.



**THIRD,** T5X reduces wear to a minimum! A special inhibitor greatly retards oxidation and gives high heat stability. A neutralizing agent protects against corrosion. Another ingredient suppresses foaming even under the most adverse operating conditions.

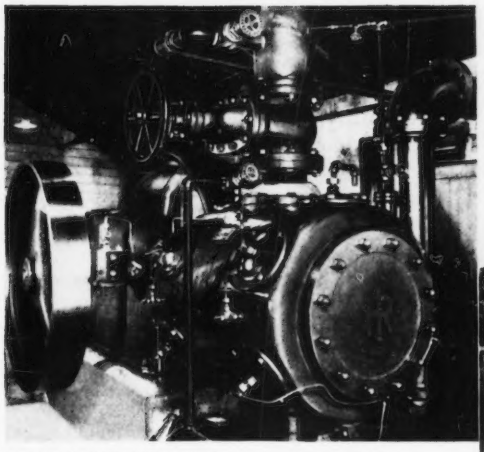


**FOURTH,** T5X forms an extremely tenacious and enduring oil film on metal surfaces that gives maximum protection against rusting of engine surfaces —even when engines are idle for long periods.

***For full information on T5X phone your local Union Oil Representative or write Sales Department, Union Oil Company, Los Angeles 14, California.***

**76** **UNION OIL COMPANY**
**OF CALIFORNIA**

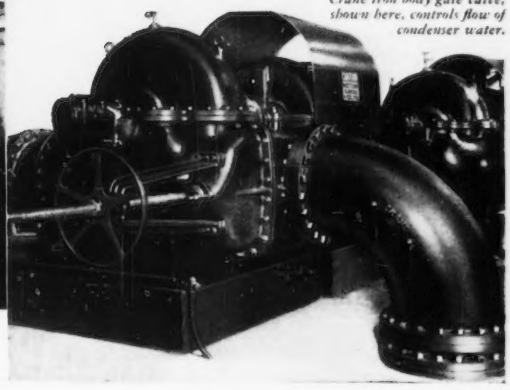
*T5X gets its distinctive color from an exclusive ingredient that helps give the oil its remarkable stability.



**FOR AIR COMPRESSOR SYSTEMS** *Crane supplies everything in piping . . . from the largest valve to the smallest fitting . . . in brass, iron, steel, or alloy materials.*

**ONE** SOURCE OF SUPPLY
RESPONSIBILITY
STANDARD OF QUALITY

**POWER HOUSE** *at a copper mine. Crane iron body gate valve, shown here, controls flow of condenser water.*



# If it's piping equipment for mines ...it's in the CRANE line

You can't equal the Crane line for completeness of selection. One catalog contains the piping equipment needed for any mine installation . . . either above or below ground. One order to your local Crane Branch or Wholesaler makes for quick delivery. For all Crane outlets are well equipped to supply your immediate needs, also have direct access to large factory stocks.

Getting all valves, fittings, pipe and accessories from this **Single Source of Supply** simplifies every piping procedure, from design to erection to maintenance work. **One Responsibility** for materials helps to get the best possible installation, avoids costly delays. **One Standard of Quality** in every item from the broad Crane line helps to assure dependable piping performance throughout your entire system.

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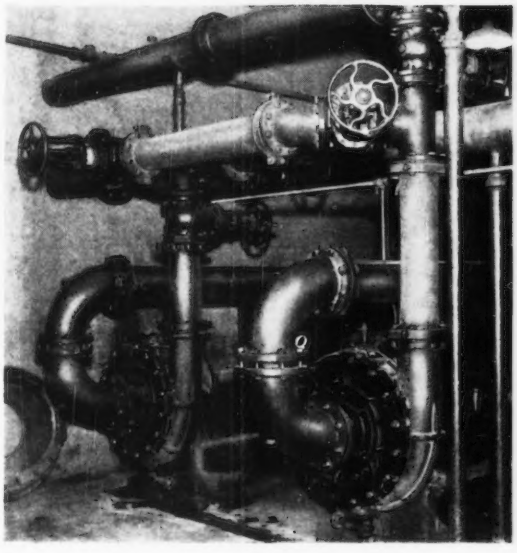

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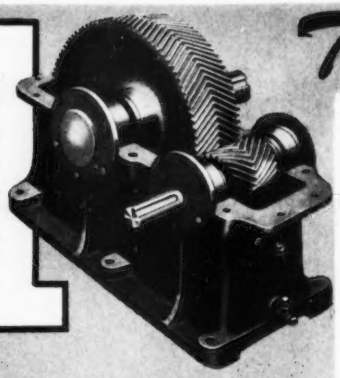

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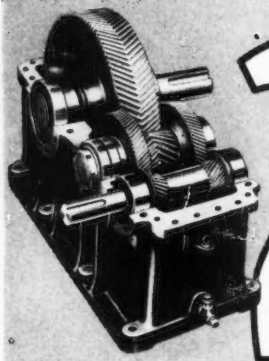

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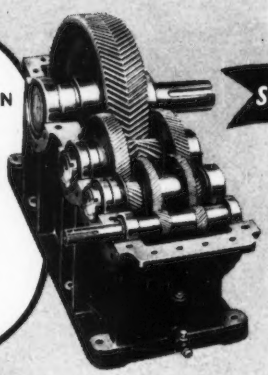

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Other outstanding features of these units are explained in our catalog H-39. Write for a copy on your business letterhead.

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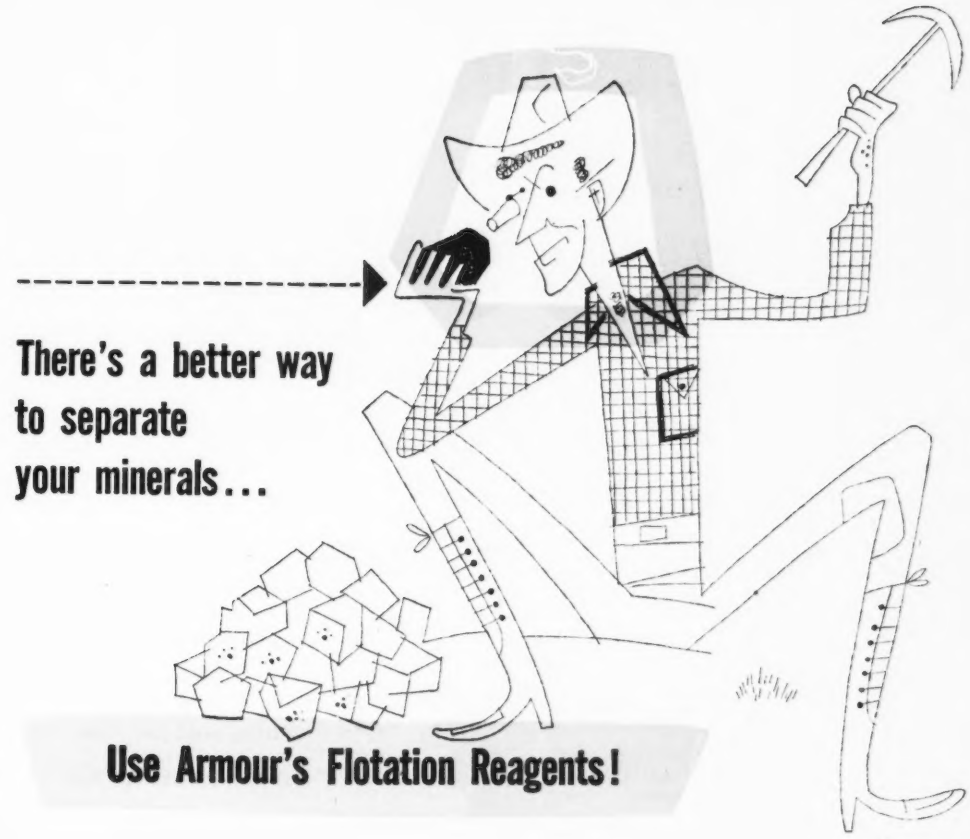

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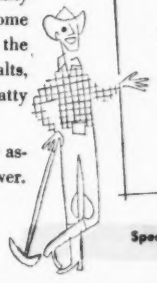

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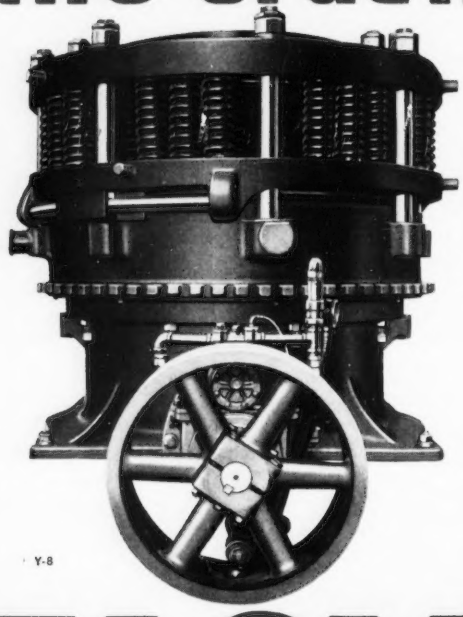

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- longer crushing stroke for greater capacity and a finer, more uniform product.
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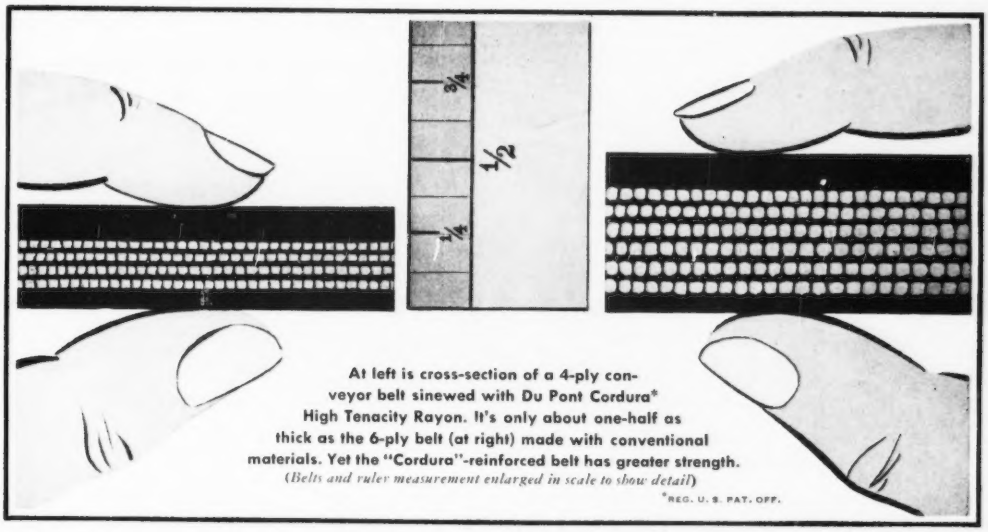
# Why Du Pont "Cordura" Rayon measures up to today's conveyor belt needs




**At left is cross-section of a 4-ply conveyor belt sinewed with Du Pont Cordura* High Tenacity Rayon. It's only about one-half as thick as the 6-ply belt (at right) made with conventional materials. Yet the "Cordura"-reinforced belt has greater strength.**
*(Belts and ruler measurement enlarged in scale to show detail)*

*REG. U. S. PAT. OFF.

High-tenacity rayon—the material that made possible thinner yet tougher truck tires—is now doing a new job for the mining industry. It packs strength into conveyor belts . . . meets the need for belts that can do a bigger hauling job.

Du Pont "Cordura" High Tenacity Rayon makes a thinner belt—yet a stronger belt. That means maximum load-carrying ability and longer life.

**LOOK TO "CORDURA" RAYON FOR THESE CONVEYOR BELT ADVANTAGES**

- ★ Greater tensile strength
- ★ Longer life
- ★ Heavier loads
- ★ Improved troughability
- ★ Longer lifts with fewer transfer points
- ★ Lighter belts that are easier to set up
- ★ Resistance to flexing
- ★ Resistance to loading impacts
- ★ Reduced operating power expense

And "Cordura" meets the need for long-lift belts that eliminate costly transfers. Its high tensile strength and low bulk provide outstanding troughability in such applications.

Next time you need a conveyor belt, ask your supplier for a belt that's sinewed with super-strong Du Pont "Cordura" Rayon. And write today for detailed information about the use of "Cordura" in conveyor belts. Address Room 4529, Rayon Division, E. I. du Pont de Nemours & Co. (Inc.), Wilmington 98, Delaware.

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## SAVED MILLING 200,000 TONS OF WASTE IN FIVE MONTHS . .

The large pile of coarse waste shown in this photograph was rejected by the H. H. Sink Float Process before milling during only 5 months operation at a well known lead-zinc mine. For scale, note 20 ton dump truck on pile.

Ask us whether a similar saving may be made for you.

*accurately controlled*

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New installations (now operating, under construction or orders) will bring the world wide capacity of H. H. Sink Float Plants to approximately nine million tons of ore annually.

**MORE EFFICIENT**

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- Rejects coarse waste without grinding it.
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- Treats mine ores, dumps, fill, development ore.
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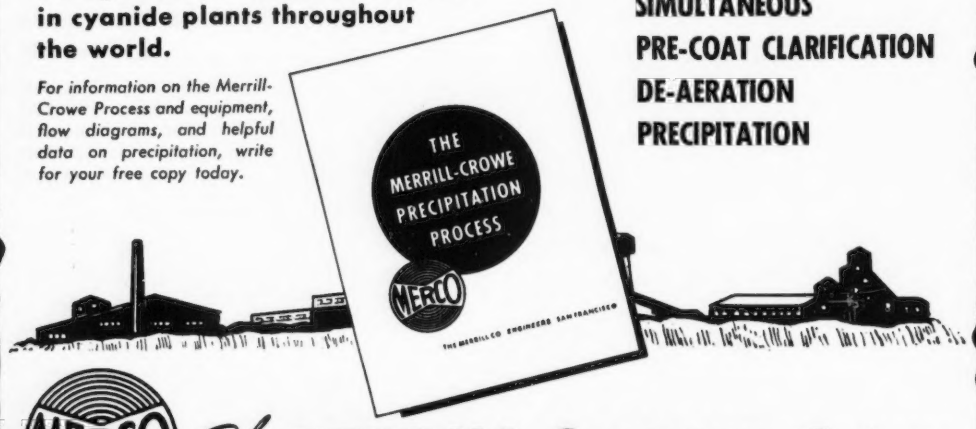


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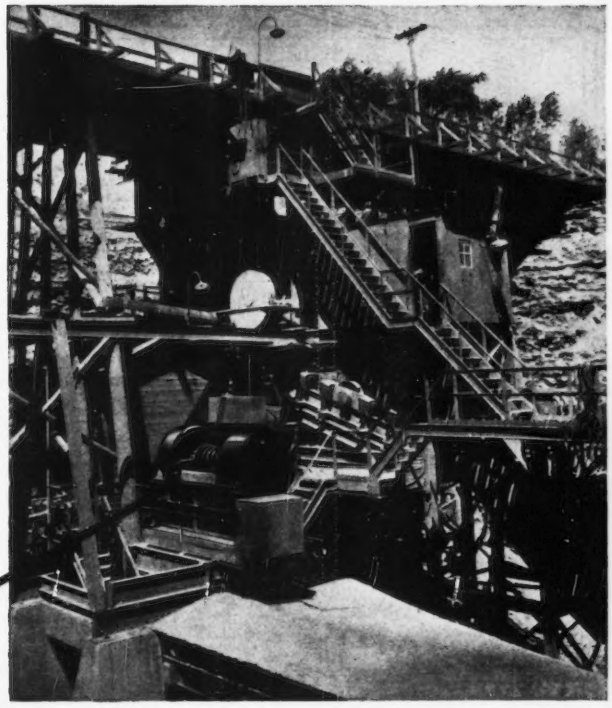
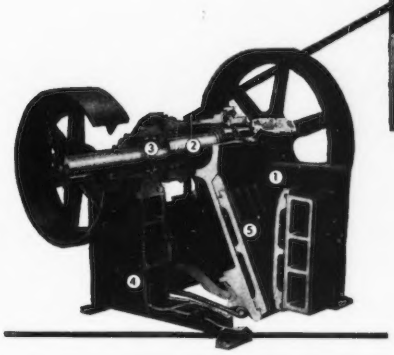
# Are Pioneer Jaw Crushers priced too low?



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5. **REVERSIBLE JAW PLATES** of manganese steel shaped for maximum capacity and wear.

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- **Principal parts of a Cottrell Precipitator.**
- **Mechanical and Electronic Rectifiers.**
- **Various types of Collecting Electrodes (rod curtains, corrugated plates, dual plates, pocket electrodes, etc.).**
- **Removal of Collected Material.**
- **Factors in Shell Construction (steel, concrete, brick, etc.).**
- **Operating Efficiencies and the Effect of Various Factors on Performance.**

...and many other basic Cottrell facts. Write for your free copy of Bulletin C103 today while supplies are adequate!

Western Precipitation is not affiliated with any other company in the field of electrical precipitation except its wholly owned subsidiaries, International Precipitation Corporation and the Precipitation Company of Canada, Ltd. Whether you are now contemplating the installation of a Cottrell Electrical Precipitator, or may be interested in such an installation at a future date, we can and will serve you in any part of the United States or other countries.

**NOW SELLING...**

COTTRELL Precipitators
MULTICLONE Collectors
TURBULAIRE Spray Dryers

**...in all parts of the U. S. A. and foreign countries.**

**WESTERN Precipitation CORPORATION**

ENGINEERS, DESIGNERS & MANUFACTURERS OF EQUIPMENT FOR COLLECTION OF SUSPENDED MATERIALS FROM GASES & LIQUIDS

*Main Offices:* 1012 WEST NINTH STREET, LOS ANGELES 15, CALIFORNIA
CHRYSLER BLDG., NEW YORK 17 • 1 LaSALLE ST. BLDG., 1 N. La SALLE ST., CHICAGO 2 • HOBART BUILDING, SAN FRANCISCO 4, CALIFORNIA
PRECIPITATION CO. OF CANADA, LTD., DOMINION SQ. BLDG., MONTREAL

# How to read with your eyes open for Business!

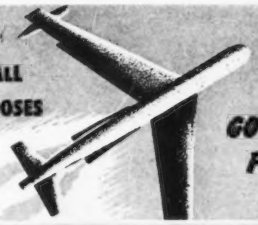
Read the ads! Every issue of this magazine contains ads that offer valuable services and useful products by which your business may be run more profitably.

The time it takes to read all the ads is time well spent. One ad alone can pay off—by informing you of new developments and new sources of supply, by helping you do a more efficient job. For example, you may locate one machine that will cut your production costs, or step up your output. Or you may discover that the equipment you've been waiting for is now available.

This magazine displays more ideas and merchandise than a trade exposition. Make every issue your buyers' guide. Read the ads as well as the articles. That's reading with your eyes open for business.

McGRAW-HILL
publications

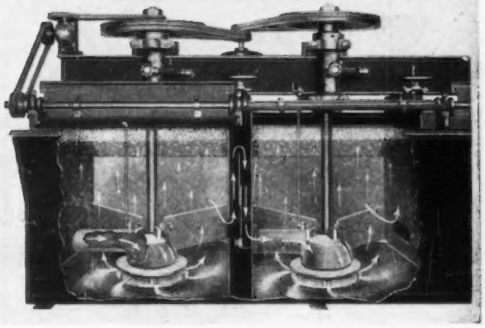
FOREMOST FOR ALL FLOTATION PURPOSES



GOOD NEWS FOR YOU

"Jetair" Flotation

A major advance in uniform and controlled air introduction—more thorough and efficient mechanical agitation combined with new "Jetair" principle that gives most complete air dispersion ever attained. Mechanical simplicity and highest metallurgical efficiency in least flotation time.



BULLETIN NO. 482 UPON REQUEST

MB

MORSE BROS. MACHINERY CO.

ESTABLISHED 1898

P. O. BOX 1708 • DENVER, COLORADO, U. S. A. • CABLE "MORSE"

HILLMAN DRILLS

AND
SAMPLING EQUIPMENT
WILL
TEST YOUR PLACER DEPOSITS
MOST
ECONOMICALLY — ACCURATELY

— WORLD PLACER HEADQUARTERS —

C. KIRK HILLMAN CO.

3201 1st Ave. South SEATTLE, WASH

CORE DRILLING

—anywhere!

"We look into the Earth"

- Mineral Prospecting
- Foundation Test Borings and Grouting
- Large diameter holes for Ventilation and Escapeways

PENNSYLVANIA Drilling CO.

DRILLING CONTRACTORS & MFRS.

1205 Chartiers Ave. PITTSBURGH, PA. WAlnut 1-5816

PERFORMANCE Plus

wherever liquids are IMPORTANT in PROCESSING

PERFECT SERVICE from these LOWER-COST PUMPS

TYPE GGU
Aurora Side Suction
Single Stage Centrifugal Pump.
Caps. to 1,400; Heads to 190 ft.

There Is a Size and Type of PUMP "by Aurora" for EVERY Pumping Need in INDUSTRY

You may count on perfect performance with lasting efficiency when you rely upon this Aurora Type GGU for either important or incidental liquids handling in industrial processing. The casing is separate from the bearing bracket, THEREFORE, the need for special metals to handle corrosives is minimized. Discharge may be placed in any of eight positions. We commend these pumps for high satisfaction and economy.

Ask for CONDENSED CATALOG "M"

APCO TURBINE-TYPE PUMPS

For high pressure, small capacity requirements up to 150 g.p.m. Wide operating range characteristics. No metal-to-metal contact. Handles non-lubricating liquids without wear. Only one moving part — the impeller.

DISTRIBUTORS IN PRINCIPAL CITIES

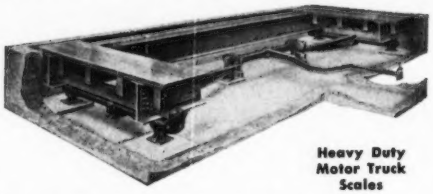
AURORA Always PUMPS

AURORA PUMP COMPANY

86 Loucks St., AURORA, ILLINOIS

# WEBB

## INDUSTRIAL and MINING EQUIPMENT



Heavy Duty Motor Truck Scales

*Heavy Weighing Equipment For:*

- Mines and Industry
- Mine Car Scales
- Mine Tipple Scales

*Since 1881*

## THE WEBB CORP.

WEBB CITY, MO., U. S. A.

*Also Manufacturers of:*

Blake Type Rock Crushers—Heavy Duty Crushing Rolls — Pillow Blocks — Elevator Buckets — Ore Washers — Pulleys for Elevator and Conveyor

*Send for Catalogs.*

## DIAMOND CORE DRILLING

*Contractors*

Electric, AIR & GASOLINE DRILLS

FOR TESTING ALL MINERAL PROPERTIES

Pressure Grouting for Mine Shafts and Wet Entries

Inside Mine Drills, Drainage Holes

**MOTT CORE DRILLING CO.**

**Huntington, W. Va.**

## Core Drilling *by Contract*

Exploration for coal and other mineral deposits. Foundation test boring and grout hole drilling for bridges, dams and all heavy structures.

*Core Drill Contractors for more than 60 years*

**JOY MANUFACTURING CO.**

*Contract Core Drill Division*

MICHIGAN CITY, INDIANA

## PLACER GOLD

Most accurately and economically tested for . . . with the

## EMPIRE DRILL

NEW YORK ENGINEERING COMPANY

75 West St., N. Y. City, U.S.A. Cable Address NYECO, N.Y.

## ASCO DIAMOND CORE BITS

**NEW Powdered Metal Bits**

Ascolite Bits Tungsten Matrix with a Rockwell C Hardness of 55-60.

Nicolite Bits Tungsten Matrix with a Rockwell 3 Hardness of 40-45.

Bronzolite Bits Tungsten Matrix with a Rockwell C Hardness of 25-30.

Crown sintered onto blank Strips for Reaming Shells

**ANTON SMIT & CO., INC.**

**333 West 52nd Street, New York 19, N. Y.**

*"The Right Bit for Every Condition"*

Testimonials from users. Ask for literature.

## CLASSIFIED ADVERTISING

for bringing business needs or opportunities to the attention of men associated in administrative, executive, management, sales and responsible technical, engineering and operating capacities with the industries served by

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Aviation Week
Bus Transportation
Business Week
Chemical Engineering
Coal Age
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Engineering News-Record
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E & M J Markets
Factory Management and Maintenance
Fleet Owner
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Nucleonics
Operating Engineer
Power
Product Engineering
Textile World
Welding Engineer

*For advertising rates or other information address:*
*Classified Advertising Division*

McGRAW-HILL PUBLISHING CO., Inc.

330 W. 42nd St., New York 18, N. Y.

# SEARCHLIGHT SECTION

## EMPLOYMENT • BUSINESS • OPPORTUNITIES • EQUIPMENT—USED or RESALE

**UNDISPLAYED RATE:**

*Not available for equipment advertising*

$1.20 a line, minimum 4 lines.
To figure advance payment count 5 average words as a line.
INDIVIDUAL EMPLOYMENT WANTED undisplayed advertising rate is one-half of above rate, payable in advance.
PROPOSALS $1.20 a line an insertion.

**INFORMATION:**

BOX NUMBERS care publication New York, Chicago or San Francisco offices count as one additional line in undisplayed ads.

DISCOUNT OF 10% if full payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

**DISPLAYED RATE:**

The advertising rate is $9.75 per inch for all advertising appearing on other than a contract basis. Contract rates quoted on request.

AN ADVERTISING INCH is measured ⅞ inch vertically on one column, 3 columns—30 inches—to a page. E.M.J.

*NEW ADVERTISEMENTS received by 10 A.M. December 19th will appear in the issue of January subject to limitations of space available.*

*REPLIES (Box No.): Address to office nearest you.*
*NEW YORK: 330 W. 42nd St. (18)*
*CHICAGO: 520 N. Michigan Ave. (11)*
*SAN FRANCISCO: 68 Post St. (4)*

### SELLING OPPORTUNITY OFFERED

EXPORT SALES Representative for both home office and foreign positions. Preference will be given to qualified salesmen having technical or practical engineering training. Applicant should be under 36 years of age. Knowledge of heavy construction and mining machinery an asset. Write full particulars in first letter and enclose recent photo. Our sales organization knows about this ad. Write SW 1397, Engineering & Mining Jl.

### POSITIONS WANTED

MANAGER 20 years progressive, successful foreign and domestic mine operation, extensive knowledge in dealing with mining, metallurgical and administrative problems, speak Spanish, available on consultant or full time engagement. PW 1274, Engineering & Mining Jl.

MINING GRADUATE now employed as Superintendent of large mine in S. A. Available reasonable notice. Age 34, married, 11 yrs., experience underground, all capacities. Location not important if with family. Details on request. PW-1211, Engineering & Mining Jl.

MINING ENGINEER, 42, married, two children, B.S. degree in mining. Eighteen years' experience underground metal mine development and production, mainly supervision in western states. Willing to go anywhere. PW-1287, Engineering & Mining Jl.

MECHANICAL AND Electrical Engineer, 15 years' experience in erection and maintenance of surface and underground mining equipment. Diesel Power Plants, etc. Fluent Spanish and English. Available January 15th, for South America location. PW 1333, Engineering & Mining Jl.

MILL SUPT.—Metallurgist. 15 years' experience sulphide and nonsulphide operations. Age 40. PW 1370, Engineering & Mining Jl.

### BUSINESS OPPORTUNITY

**For Sale 1800 Acres**

Mica and Feldspar Lands in North Carolina 1150 acres in fee, 650 acres in mineral rights. All near Spruce Pine, N. C., on the C. C. & O. RR. Contact Edgar B. Clapp, Bakersville, N. C., Box 156.

Diamond Drill Supervisor wants position as Supervisor or Foreman in Western or Mid-Western U.S.A. Seventeen years experience, nine in position of responsibility. Presently employed as Supervisor in Canada. Excellent References.

**PW 1456 Engineering & Mining Journal**
**520 N. Michigan Ave., Chicago 11, Ill.**

*When Answering*
BOX NUMBERS . . .

to expedite the handling of your correspondence and avoid confusion, please do not address a single reply to more than one individual box number. Be sure to address separate replies for each advertisement.

**LEASER WANTED**

Tunnel on property on Route 53 near Bellefonte, Pa., crosscuts several veins. Vein samples assay 8.7 to 24% lead, 8.4 to 12.9% zinc. Gold, silver, copper also present. Leaser wanted on royalty basis. For further information contact:

**C. F. SCHAD**
**630 N. Allegheny St., Bellefonte, Pa.**

**OPEN PIT MINING**

Contractor with excellent equipment and experienced personnel interested in excavating, material handling, or open pit mining work.

**CW1319—Engineering & Mining Journal**
**330 W. 42nd St., New York 18, N. Y.**

**640 ACRES PATENTED COAL LAND**

60 million tons bituminous coal, reports any public library, U. S. Geol. Su. Bull. 225—Page 240-246, or Deer Creek Coal Field. $15.00 per acre.

**WEST END MINING CO.**
1921½ Maple Ave., Los Angeles 11, Calif.

**WANTED**

**Large engineering firm wishes to acquire several complete plants through purchase of (1) capital stock, (2) assets, (3) machinery and equipment whole or in part. Personnel retained where possible, strictest confidence.**

***Box 1231, 1474 Broadway, New York 18, N. Y.***

**APPR. 200 ACRES**
**PATENTED MINERAL CLAIMS**

One Block. Near Castle Dome Mine. Sulphide Ore. $15.00 per Acre.

**WEST END MINING CO.**
1921½ Maple Ave., Los Angeles 11, Calif.

**WANTED**

Ores and chemicals—any raw materials from owners.

**Gertrude A. Meeker**
(25 years Mining experience)
8468 Ridpath Drive, Hollywood 46, Calif.

**BUYERS OF SURPLUS COPPER, INSULATED WIRES AND CABLES**

No lengths too long or too short.
Telephone: EAstgate 7-4778

**PIERCE CABLE CO.**
2674 Clybourn Ave., Chicago 14, Ill.

**2 CLAIMS**

Mineral Survey 3596-3597. Kennecott Corp. Claims on All Sides at Ray.

**WEST END MINING CO.**
1921½ Maple Ave., Los Angeles 11, Cal.

**2" HOSE SALE**
**DELIVERED FREIGHT PREPAID**

**BRAND NEW "GOODRICH"**
**4" DISCHARGE HOSE**

Complete with male and female couplings, 200-lbs. pressure, rubber-lined, in 50-ft. lengths. SALE PRICE:

**USES**
Strip Mining; Portable Pipe Lines; Fire Hose; Sewer & Trench Work; Manholes; Discharge on Pumps.

**$30.00**
**50-FT. LENGTHS**
FREIGHT PREPAID UNITED STATES

***Immediate Delivery*** • ***Order Now***

**BERNSTEIN BROTHERS**
SINCE 1880 • PHONE 8108
PUEBLO, COLORADO

**For Sale**

Complete 75-ton lead-zinc flotation plant with auxiliary equipment, concentrating tables, 150-ft. 18 in. belt conveyor, 2-drum dragline hoist with scraper with 25-h.p. motor, 3- x 6-ft. Tyler Niagara screen and other items.

**Chestnut Hill Zinc Company**
**Box 1026** **Galena, Illinois**

**FOR SALE**

1 Shaft sinking or small mine hoist. Lidgerwood 24" diam. drum, 21" wide. Will wind 1,000' of ⅝" rope and hoist 2 ton payload at 200' per minute. Complete with 440 volt, 3 ph., 60 cycle Slip Ring, 50 H.P. Motor. Price $1,000.

**EASTERN MAGNESIA TALC CO., Inc.**
**206 Bank Street** **Burlington, Vermont**

*It costs no more*
to have your instruments of any make
*repaired* by the makers of the
WORLD'S FINEST SURVEYING INSTRUMENTS
C. L. BERGER & SONS, INC.
37 Williams Street, Boston 19, Mass.

**LOCOMOTIVES WANTED**

If you have a Mancha locomotive for sale, mail description, serial number and price.

**W9800 Engineering and Mining Journal**
**330 W. 42nd St., New York 18, N. Y.**

**SLUDGES WANTED**

If you have any metallurgical or chemical by-product sludges which may contain rare or minor metals, please contact:

**Metallurgical Process Division**
**Saratoga Laboratories, Inc.**
**Saratoga Springs, New York**

Sludges bought outright or recovery processes developed under contract.

• **STRIPPING CONTRACTOR**

***wants a 50,000,000 Cubic Yard or larger project.***

• **HAVE EXPERIENCED CREW,**

***equipment, core drill, etc., available.***

• **PREFER WORK IN UNITED STATES**

***or Canada; but will consider work elsewhere.***

**RUSSELL BADGETT**

3251 Southern Avenue

**MEMPHIS, TENNESSEE**



**Mine and Slope Hoists**

1—20,000# Dbl. Drum Mundy, w/o motor
1—26,000# Nordberg Sgl. Drum
1—10,000# Nordberg Sgl. Drum AC
1—17,000# Ottumwa Sgl. Drum AC
1—11,000# Ottumwa Sgl. Drum AC
1—16,000# Allis Chalmers Sgl. Drum
1—30,000# Allis Chalmers Dbl. Drum AC
1— 7,000# Allis Chalmers Dbl. Drum AC
1— 7,000# Flory Sgl. Drum AC
1—10,000# Wellman AC

**Crushers and Screens**

1—12x16 Eagle Dbl. Roll
1—18x20 Eagle Dbl. Roll
1—3B American Pulverizer
1—30x54 McNally Pitts. Sgl. Roll
2—24x20 Jeff. Flextooth
1—25S Kennedy Van Saun Gearless
1—8' Superior McCully Gyratory
1—30x36 S.A. Ring type Knittel(never used)
2—4x10 S.A. Vibrating Screens
4—Tyler Vibrating Screens

**Carpullers and Loaders**

1—5000# Jeffrey Carspotter AC
1—6000# Brownie Carspotter AC
1—5000# Link Belt Carspotter AC
1—S.A. Heavy Duty Loader AC

**Miscellaneous**

1—5 ton Merrick Weightometer
2—2½" Dayton Dowd 300 GM Cent. Pump, AC Motor
1—48" Colo. Simplex Classifier
2—100 ton, 5 sheave; 2—50 and 2—40 ton 4 sheave blocks, complete, new.
1—11B Sullivan Cutter with Bowdil bar, chain and bug duster, 50 HP DC motor
1—PL1114 Joy Elevator, 10 HP DC, permissible motor
1—Buc. Erie 885 3¼ yd. Electric Shovel

**HAWKINS & CO.**

**154 So. Michigan Ave., Chicago 3, Ill.**

**TELEPHONE HARRISON 7-0725**



**HEAT** **PORTABLE HEATER SALE!**

100,000 BTU PORTABLE
**HEATER and DRYER**

Stewart - Warner portable, powerful 100,000 BTU gas oline-burning Heaters, with Turbine type blowers; 1¼ hp. air-cooled, ball bearing engine; 3 ducts (45-ft. total). IMMEDIATE DELIVERY

**SALE PRICE $195.00**

Excellent Operating Condition Guaranteed
Especially Adapted for MINE USE

**HEATING** Mills, Bunkhouses, Dry Rooms, Large Boarding Houses, Shops, Sheds, Warehouses, Bldgs. under Construction, Spot Heating, etc.

**THAWING** Frozen Ore, or preventing freezing in Ore Bins, Frozen Areas, Machinery, Pipe Lines, Tanks, etc.

**DRYING** Concentrates in Ore in conjunction with Tumbler; Wet ore in bins; Plaster, Paint, Mortar, etc.

**PRE-HEATING** engines, tractors, trucks, equipment, etc.

• VAST QUANTITY OF REPLACEMENT PARTS • A 50 SERVICE MANUAL & PARTS CATALOG
PHONE COLLECT—your Heater can be shipped within 2 hours, or, SEND FOR LITERATURE.

**BERNSTEIN BROS.**

**MACHINERY CORPORATION**

Phone 8404 • "Since 1890" • PUEBLO, COLO.



***FOR SALE***

**AIR COMPRESSOR**

20,000 CFM at 90 psi, 3 stage, mfd. 1943 by Clark Bros. Driven by 450 HP, 4 cycle Diesel (Compressor for sale separately, if desired).

**MOTORS**

1500 HP, 525V DC, 600 RPM, Westinghouse.

**GENERATORS**

1200 KW, 525V DC, 750 RPM, Allis Chalmers.

**DIESEL GENERATORS**

650 KW, 240V DC, General Motors model 12-567.
290 KW, 120/240V DC, General Motors model 8-268A.
100 KW, 120/240V DC, Superior model GDB-8.

**HUGO NEU CORPORATION**

**31 Nassau St. New York 5, N.Y.**

**REctor 2-1334**



**SPECIAL OFFERING**

1—New 18 x 32 solid steel frame style D Crusher.
1—Factory rnfd.—6x10 plate from Crusher.
1—New 14 x 28 solid steel frame Jaw Crusher.
1—No. 6 McCully Crusher in good running condition, just taken from service.

**ACME ROAD MACHINERY CO.**

FRANKFORT NEW YORK



**MOTORS, GENERATORS, TRANSFORMERS**

1 — 1500 H.P.
Bought and Sold
New and Rebuilt

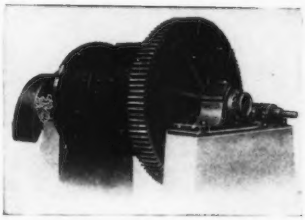
**ELECTRIC EQUIPMENT CO.**

ROCHESTER 1, N. Y.

## DEPENDABLE EQUIPMENT AT A SAVINGS IN TIME AND COST

**COMPRESSORS**

1—80 CFM Worthington, 6"x5".
1—131 CFM Chicago Pneumatic, 8⅛" and 4¾"x5".
1—139 CFM Chicago-Pneumatic, 8⅜" and 4¾"x5".
1—142 CFM Ingersoll-Rand Motor Compressor, 6" and 5"x5" with built in 25 HP. West. motor.
1—194 CFM Gardner-Denver 7" and 5¾"x5".
1—284 CFM Ingersoll-Rand, 6 cyl., 6" and 5"x5".
2—293 CFM Ingersoll-Rand, 12" & 6½"x10".
1—315 CFM Ingersoll-Rand, 6 cyl., 7" and 6¾"x5".
1—382 CFM Chicago-Pneumatic, 4 cyl., 9⅜" and 5½"x5½".
1—447 CFM Ingersoll-Rand, 14" & 7½"x12".
1—528 CFM Ingersoll-Rand, 14"x12".
1—637 CFM Sullivan angle compound, 14" and 8⅜"x10".
1—800 CFM Ingersoll-Rand 18" & 11"x16".
1—888 CFM Ingersoll-Rand, 19" & 12"x16".
1—105 CFM Schramm portable straight line, 3-13/16"x4½", driven by Buda gas engine, trailer mounted on 4 pneu. tires.
1—210 CFM Jaeger portable, 5" & 4½"x4", driven by Continental gas engine, trailer mounted on 4 pneumatic rubber tires.
1—210 CFM Worthington portable "Blue Brute", 6" & 5¾"x4¾", driven by Continental gas engine, trailer mounted on 4 steel wheels.
2—310 CFM Gardner-Denver portable, 6"x 5½", driven by Buda Gas Engine.
1—153 CFM Ingersoll-Rand low pressure, 9"x6".
1—273 CFM Ingersoll-Rand low pressure, 13"x9".
1—698 CFM Union low pressure, 16"x12".
1—840 CFM Laidlaw duplex low pressure, 13"x10".



**BALL AND ROD MILLS**

1—36"x24" New Morse Bros. Batch Mill.
1—4'x4' New Ball Mill.
1—4'x4' Denver Ball Mill.
2—6'x36" Hardinge Conical Ball Mills.
1—6'x48" Hardinge Conical Ball Mill.
1—6'x8' Marcy Ball Mill.
1—8'x22" Hardinge Conical Pebble Mill.
1—3'x8' Denver Eng. Works Tube Mill.
1—3'x9' Ruth Rod Mill.
1—5'x36" Hardinge Conical Ball Mill.
1—64½ Marcy Ball Mill.

**CLASSIFIERS**

1—36"x20' Dorr Duplex Rake Classifier.
1—54"x16' Morse "Trueline" Rake Classifier.
1—8' bowl attachment from Dorr 27" simplex Classifier.
3—"St. Joe" type Hydraulic Classifiers, 10 cells, 20 spigots.
1—24"x8' Akins Classifier.

**FILTERS**

1—3'x2' Morse all metal drum Filter.
1—3'x4' Oliver drum Filter.
1—4'x2' disc Eimco Filter.
1—4'x3' disc Morse Filter.
2—6'x2' disc American Filters.
1—6'x3' disc American Filter.

**TUGGER HOISTS**

5—I-R size EU "Utility" air hoists, single drum.
1—I-R size A-4NN-OJ2 drum air hoist.
1—Sullivan RH 5 HP single drum electric slusher hoist.
1—Sullivan RH 7½ HP single drum electric slusher hoist.
2—I-R size 107, 7½ HP single drum electric slusher hoists.
1—I-R size 5NN-OH 5 HP double drum electric slusher hoist.
1—I-R size 20-MNM-2D 20 HP three drum electric slusher hoist.
1—Sullivan model B-21U 25 HP double drum electric slusher hoist.
3—Sullivan type HE 6½ HP D.C. single drum electric hoists.
9—Sullivan type HDE 6½ HP D.C. double drum electric hoists.

**JAW CRUSHERS**

3—4"x6" new Morse Jaw Crushers.
2—8"x5" Universal Semi-Steel Crusher.
1—8"x24" Rogers Cast Steel Crusher.
1—9"x15" Farrell Blake type.
1—9"x16" Cedar Rapids All-Steel Crusher.
1—9"x16" New Morse Crusher.
1—9"x21" Telsmith Jaw Crushers.
1—8"x36" Universal All-Steel Crusher.
1—9"x36" Cedar Rapids.
1—15"x20" Universal All-Steel Crusher.
1—10"x24" Allis-Chalmers Jaw Crusher.
1—24"x36" Traylor "Type A."

BETTER MACHINERY—IT'S FULLY RECONDITIONED

ESTABLISHED 1898

# MORSE BROS. MACHINERY CO.

P.O.BOX 1708 DENVER, COLORADO, U.S.A. CABLE "MORSE

COMPLETE ORE-MILLING PLANTS • • • CONCENTRATION • FLOTATION • MACHINERY • CYANIDE • AMALGAMATION

General Office and Plant: 2900 BRIGHTON BLVD., DENVER, COLO.

---

## Unusual Opportunity

**RUBBER CONVEYOR BELTING**

**(Mfd. by Goodyear Tire & Rubber Co.)**

***SLIGHTLY USED***

***EXCELLENT CONDITION***

***EXTREMELY LOW PRICED***

At present moment Belting can be inspected on operating Conveyors. Being removed by December 15th, 1949.

1,800 Ft. 60" x 9 Ply, 48 Oz. Duck, ¼" top x 1/16" bottom covers.
1,700 Ft. 48" x 7 Ply, 48 Oz. Duck, ¼" top x 1/16" bottom covers.

## Also Available

**BRAND NEW RUBBER CONVEYOR BELTING**

***GUARANTEED FIRST GRADE***

***LOW PRICED***

2,600 Ft. 36" x 6 Ply, 32 Oz. Duck, 3/16" top x 1/16" bottom covers.
1,000 Ft. 30" x 5 Ply, 32 Oz. Duck, ⅛" top x 1/16" bottom covers.
2,000 Ft. 24" x 5 Ply, 28 Oz. Duck, ⅛" top x 1/32" bottom covers.
2,500 Ft. 18" x 4 Ply, 28 Oz. Duck, ⅛" top x 1/32" bottom covers.

*If interested in other sizes, please advise.*

**PHONE WIRE WRITE**

**CARLYLE RUBBER COMPANY, INC.**

**62-66 Park Place New York 7, N. Y.**

**Phone: Digby 9-3810**

---

**ELECTRICAL CABLE**

- for every industrial and power application.
- Special construction. Odd lengths.
- Large stocks on hand of high voltage, lead covered cables not ordinarily stocked by your regular supplies.
- Cut to length. Reasonably priced.

**UNIVERSAL Wire and Cable Co.**

2674 N. Clybourn Ave. Chicago 14, Ill.

---

# DIESEL GENERATOR PLANTS

COMPLETE WITH SWITCHBOARDS

1000 KW to 100 KW

STATIONARY and PORTABLE

AT GREATLY REDUCED PRICES

NEW UNIT GUARANTEE

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2 100 KW Transformers, 2300-220.
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|---|---|---|---|---|---|---|---|
| 48" | 8 | 1/8" | 1/16" | 24" | 4 | 1/8" | 1/32" |
| 42" | 5 | 1/8" | 1/16" | 20" | 5 | 1/8" | 1/32" |
| 36" | 6 | 1/8" | 1/16" | 20" | 4 | 1/8" | 1/32" |
| 30" | 6 | 1/8" | 1/16" | 18" | 4 | 1/8" | 1/32" |
| 30" | 5 | 1/8" | 1/16" | 16" | 4 | 1/8" | 1/32" |
| 26" | 5 | 1/8" | 1/32" | 14" | 4 | 1/16" | 1/32" |
| 24" | 5 | 1/8" | 1/32" | 12" | 4 | 1/16" | 1/32" |

*Inquire For Prices — Mention Size and Lengths*

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**HEAVY-DUTY FRICTION SURFACE**

| Width | Ply | Width | Ply | Width | Ply |
|---|---|---|---|---|---|
| 18" | 6 | 10" | 6 | 6" | 5 |
| 16" | 6 | 10" | 5 | 5" | 5 |
| 14" | 6 | 8" | 6 | 4" | 5 |
| 12" | 6 | 8" | 5 | 4" | 4 |
| 12" | 5 | 6" | 6 | 3" | 4 |

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"A" Width All Sizes —
"B" Width All Sizes —
"C" Width All Sizes —
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APPROVED SPECIFICATION HOSE EACH LENGTH WITH COUPLINGS ATTACHED

| I.D. Size | Length | Per Length |
|---|---|---|
| 2½" | 50 feet | $28.00 |
| | 25 " | 16.00 |
| 2" | 50 " | 23.00 |
| | 25 " | 13.00 |
| 1½" | 50 " | 20.00 |
| | 25 " | 11.00 |

Specify Thread On Couplings

**AIR HOSE**

| I.D. Size | Length | per Length | Universal Couplings |
|---|---|---|---|
| ½" | 25 feet | $5.00 | $1.50 Pair |
| | 50 " | 10.00 | 1.50 Pair |
| ¾" | 25 " | 7.50 | 1.50 Pair |
| | 50 " | 15.00 | 1.50 Pair |
| 1" | 25 " | 10.00 | 1.50 Pair |
| | 50 " | 20.00 | 1.50 Pair |

LARGER SIZES ALSO AVAILABLE
*All Prices—Net — F.O.B. New York*

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| ¾" | 25 feet | $4.25 | | 35 feet | $10.50 |
| | 50 " | 8.00 | | 40 " | 12.00 |
| 1" | 25 " | 6.25 | | 50 " | 15.00 |
| | 50 " | 12.50 | 1½" | 25 " | 10.00 |
| 1¼" | 25 " | 7.50 | | 35 " | 14.00 |
| | | | | 50 " | 20.00 |

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# ALPHABETICAL INDEX TO ADVERTISERS

**Where an asterisk * precedes manufacturer's name, more detailed information may be found in the *1948-49 edition of the Mining Catalogs***


*Allen-Sherman-Hoff Co. .....Second Cover
*Allis-Chalmers Co. ..... 7
*Aluminum Co. of America..... 41
*American Air Filter Co., Inc. ..... 121
*American Manganese Steel Div. (American Brake Shoe Co.).....20, 138
*American Steel & Wire Co. .....28, 29
Armour & Co. (Chemical Div.) ..... 161
*Atlas Car & Mfg. Co. ..... 133
Atlas Powder Co. ..... 23
Atlas Steels, Ltd. ..... 123
Aurora Pump Co. ..... 173

*Barber-Greene Co. ..... 132
*Bethlehem Steel Corp. ..... 56
*Bird Machine Co. ..... 107
*Bixby-Zimmer Engineering Co. ..... 141
Black, Sivalls & Bryson, Inc. ..... 145
Braun Corporation..... 120
*Bucyrus-Erie Co. ..... 40
*Buell Engineering Co. ..... 129
Byron-Jackson (Pump Div.) ..... 147

*Card Iron Works, C. S. ..... 138
Carter Products Corp. ..... 124
Cate Equipment Co. ..... 122
Caterpillar Tractor Co. ..... 25
Chain Belt Co. ..... 156
*Chicago Pneumatic Tool Co. .....38, 39
Climax Molybdenum Co. ..... 103
*Colorado Fuel & Iron Corp. ..... 131
*Colorado Iron Works Co. ..... 109
*Coppus Engineering Corp. ..... 143
*Crane Company..... 159

Davenport Locomotive Works..... 137
*Deister Concentrator Co. ..... 115
*Deister Machine Co. ..... 135
*Denver Equipment Co. ..... 25
*Denver Fire Clay Co. ..... 137
*Differential Steel Car Co. ..... 127
*Dixie Machinery Mfg. Co. ..... 116
*Dorr Company..... 46
*Dow Chemical Co. (Great Western Div.) ..... 144
duPont de Nemours & Co., (Inc.) E. I (Rayon Div.)..... 163

*Edison Storage Bat. Div. Thos A. Edison, Inc. ..... 104
*Eimco Corporation..... 35
*Electric Storage Battery Co. ..... 95
*Euclid Road Machinery Co. ..... 153

*Galigher Co. ..... 32
*Gardner-Denver Co. ..... 150
*Garlock Packing Co. ..... 181
Gates Rubber Co. ..... 22
*General Electric Co. (Apparatus Department.) .....16, 17
General Tire & Rubber Co. ..... 155
*Goodman Manufacturing Co. ..... 53
Goodrich Co., B. F. ..... 4
Goodyear Tire & Rubber Co. ..... 21
Greensburg Machine Co. ..... 127

Hamilton Rubber Mfg. Co. ..... 42
*Hardinge Co., Inc. ..... 182
Harnischfeger Corp. ..... 33
*Hazard Insulated Wire Works Div. of Okonite Co. ..... 6
*Hazard Wire Rope Div. American Chain & Cable.....Third Cover
Hillman Co., C. Kirk..... 173

*Independent Pneumatic Tool Co. ..... 165
*Ingersoll-Rand Co. ..... 3
Interstate Drop Forge Co. ..... 134

*Jenkins Bros. ..... 97
*Johnson Co., C. A. .....10, 11
Jones & Laughlin Steel Corp. .....43, 99
*Joy Manufacturing Co. .....36, 37, 174

*Kennedy-Van Saun Mfg. & Engrg. Corp. .....26, 27
Knapp Mills, Inc. ..... 128
Knox Manufacturing Co. ..... 118
*Koehring Co. .....10, 11
*Kwik Mix.....10, 11

Laughlin Co., Thomas..... 110
Lavne & Bowler, Inc. ..... 181
*Longyear Co., E. J. ..... 31
Lubriplate Div. Fiske Bros. Refining Co. ..... 181

McGraw-Hill Catalog Service..... 142
Mack Trucks, Inc. ..... 148
Merrill Co. ..... 168
*Merrick Scale Mfg. Co. ..... 142
*Mine Safety Appliances Co. .....44, 45
*Morse Bros. Machinery Co. ..... 173
*Mosebach Electric Machinery Co. ..... 138
Mott Core Drilling Co. ..... 174

New York Engineering Co. ..... 174
*Nordberg Manufacturing Co. ..... 54
Northwest Engineering Co. ..... 15

Ohio Brass Company..... 57

*Parsons Co. .....10, 11
Pennsylvania Drilling Co. ..... 173
*Philadelphia Gear Works, Inc. ..... 160
*Pioneer Engineering Works..... 169
Pittsburgh Lectromelt Furnace Corp..... 168

Roebling's Sons Co., John A. ..... 51
*Roots-Connersville Blower Corp. ..... 119
Ryerson & Sons, Inc., Jos. T. ..... 133

Sandvik Steel, Inc. ..... 47
*Sanford-Day Iron Works, Inc. ..... 154
*Sauerman Bros. ..... 134
Schaffer Poidometer Co. ..... 135
Searchlight Section.....175, 179
Sheffield Steel Corporation..... 125
*Sink & Float Corporation..... 167
Sintering Machinery Corp. ..... 123
SKF Industries, Inc. ..... 164
Smit & Co., Anton..... 174
*Smit & Sons, J. K..... 111
Smith Engineering Works..... 162
*Sprague & Henwood, Inc. ..... 126
Standard Oil of Cal. ..... 14
Stearns Magnetic Mfg. Co. ..... 117
*Stephens-Adamson Mfg. Co. ..... 30
*Sturtevant Mill Co. ..... 146
Syntron Co. ..... 130

Texas Company .....8, 9
*Thermoid Company..... 34
*Thomas Flexible Coupling Co. ..... 112
Throwaway Bit Co. .....18, 19
*Timken Roller Bearing Co. .....48, 49, Fourth Cover
*Traylor Engineering & Mfg. Co.....12, 13

Union Oil Co. of Cal. ..... 158
U. S. Steel Supply Co. ..... 55
U. S. Steel Subsidiaries.....28, 29, 55

Vickers, Inc., Div. of Sperry Corp. ..... 157
Victaulic Co. of America..... 105
*Vulcan Iron Works..... 52

Walworth Co. ..... 50
*Walter Motor Truck Co..... 151
*Western Machinery Co. ..... 149
Western Precipitation Corp. ..... 168
*Wilfley & Sons Co., A. R..... 58
*Willson Products, Inc. ..... 136
Webb Corporation..... 174

Yuba Manufacturing Co. ..... 113


■


PROFESSIONAL SERVICES..... 170


■

SEARCHLIGHT SECTION
*(Classified Advertising)*


EMPLOYMENT

Positions Vacant ..... 175
Selling Opportunities Offered ..... 175
Positions Wanted ..... 175

SPECIAL SERVICES

Contract Work ..... 175

BUSINESS OPPORTUNITIES

Offered ..... 175

PROPERTY

For Sale ..... 175
Wanted ..... 175

EQUIPMENT

(Used or Surplus New)
For Sale .....175-179

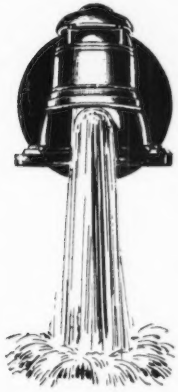
WANTED

Equipment ..... 175


ADVERTISERS INDEX


Acme Road Machinery Co. ..... 176
American Air Compressor Corp. ..... 178
Badgett Russell..... 176
Berger & Sons, Inc., C. L. ..... 175
Bernstein Bros. .....175, 176
Carlyle Rubber Co., Inc. .....177, 179
Chestnut Hill Zinc Co. ..... 175
Diamond Corp., of America..... 178
Dulien Steel Products, Inc. ..... 178
Eastern Magnesia Talc Co., Inc. ..... 175
Electric Equipment Co. ..... 176
Florence Machinery & Supply Co. ..... 178
Governeur Talc Co., Inc. ..... 179
Hawkins & Co. ..... 176
Heineken, W. P. ..... 179
Hercules Electric Machy. & Equip. Co.... 177
Johnson & Hoehler, Inc. ..... 177
Lefton Industrial Corp. ..... 178
Marriott, Lee ..... 179
Meeker, Gertrude Al ..... 175
Morse Bros. Machy. Co. ..... 177
Neu Corp., Hugo..... 176
O'Neill, A. J. ..... 179
Perry Equipment Corp. ..... 178
Pierce Cable Co. ..... 175
Saratoga Laboratories, Inc. ..... 175
Schad, C. F. ..... 175
Stanhope, Inc., R. C. ..... 178
Thompson Co., J. Parker..... 177
Universal Wire & Cable Co. ..... 177
West End Mining Co. ..... 175

# BUILT FOR THE BIGGEST DE-WATERING JOBS



If you want big ruggedly built pumps that will handle the toughest de-watering jobs at low operation cost, get the facts on Layne Vertical Turbine Pumps. They're built to handle tremendous quantities of water at a new low in operation cost. Layne Verticals are used in the biggest mines of North and South America. Now available in all sizes.

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General Offices
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LAYNE

VERTICAL TURBINE PUMPS

# LONGER LIFE for ball and roller bearings

Your investment in anti-friction bearings is certainly great enough to warrant your investigating the possible savings to be made through the use of LUBRIPLATE lubricants. They actually preserve bearing surfaces, arrest progressive wear and protect against rust and corrosion. There are LUBRIPLATE lubricants for all speeds, all operating temperatures and conditions.

*Write for a copy of "The LUBRIPLATE FILM" written especially for your industry.*

LUBRIPLATE

DEALERS FROM COAST TO COAST
CONSULT YOUR CLASSIFIED TELEPHONE BOOK

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*Which Garlock rod packing automatically adjusts itself to changing pressures?*

ANSWER: CHEVRON*

*Reg. U.S. Pat. Off.

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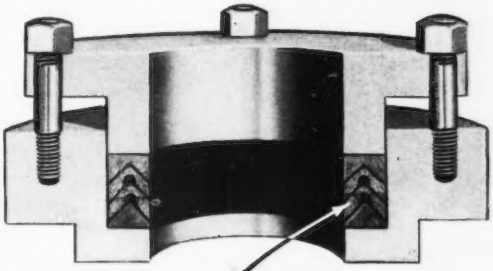
THE GARLOCK PACKING CO., PALMYRA, N. Y.
In Canada: The Garlock Packing Co. of Canada Ltd., Montreal, Que.



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GARLOCK

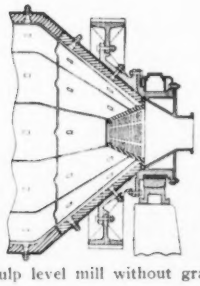
*"When to put*

*GRATES in mills."*

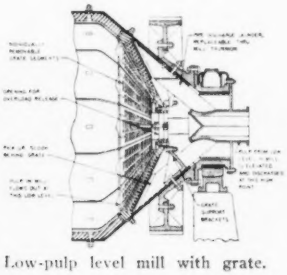
**FIRST** Figure your initial installation as a trunnion-overflow mill with adequate volume. It will cost you no more.

**SECOND** *If* you find, later, that you need additional capacity from your mill—add a grate. You can get 10% to 20% increased output with a grate . . . *but*, don't forget, you'll then have to put that much more power into the mill.

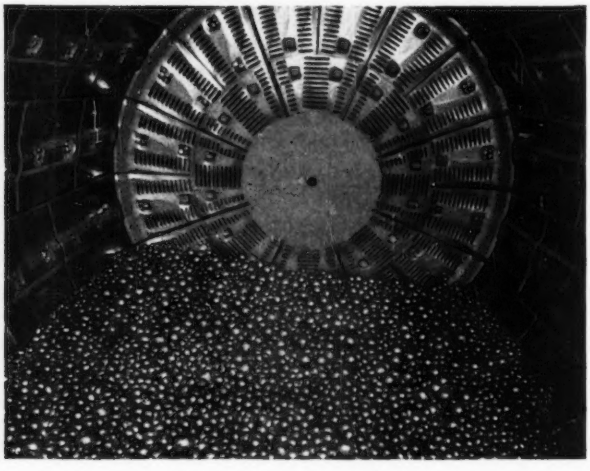
Why burn your bridges behind you at the outset by installing a grate-discharge mill whose capacity can never be increased?



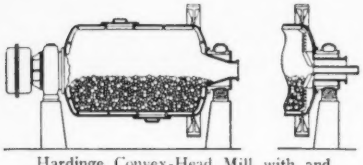
Conical High-pulp level mill without grate.



Conical Low-pulp level mill with grate.



Interior of Hardinge Convex-Head Mill with grate.



Hardinge Convex-Head Mill with and without grate.

**HARDINGE**

COMPANY INCORPORATED

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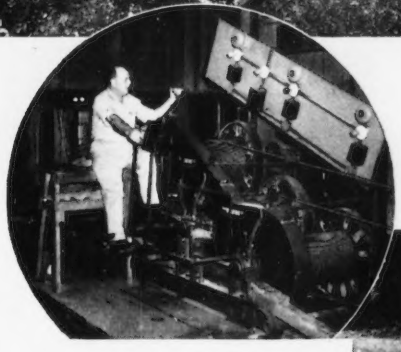
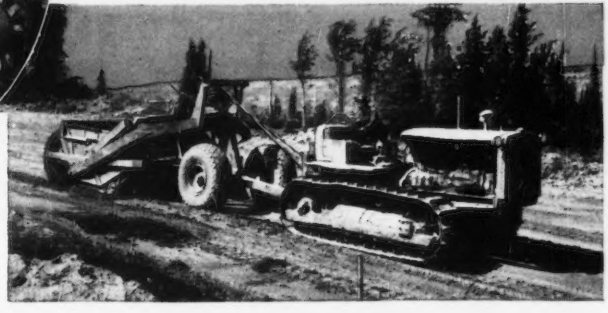
# Improved Performance with LAY-SET PREFORMED

**In strip mining** costs are figured on a "per-ton" basis. The faster the overburden is handled and the coal or minerals speeded to market, the more profit "per-ton." Dependable wire rope helps lower costs because there are fewer shut-downs. LAY-SET Preformed's *improved performance* makes it dependable . . . and a favorite wire rope of strip operators everywhere.



**Hoists on construction jobs** require safe, dependable wire rope because a single line is used to lift materials—and men. Here's a job for LAY-SET Preformed, the Green Strand Wire Rope with improved plow steel wires. It has great strength and flexibility. It means *improved performance.*



**Building roads and dams** is another use of wire rope where LAY-SET Preformed gives *improved performance.* Hazard's Streamlined Scraper Cable was designed for this tough service. It stands shock loads and lasts longer bending around small sheaves.

***For every wire rope use*** *— in mining, industrial, contracting— there are HAZARD Wire Ropes that will improve performance. And there is a HAZARD distributor near you who can supply your needs. Call him today for full information.*

ACCO
*In Business for Your Safety*

LAY-SET Preformed GREEN STRAND WIRE ROPE

**HAZARD WIRE ROPE**
A DIVISION OF AMERICAN CHAIN & CABLE

TRADE MARK

Wilkes-Barre, Pa., Atlanta, Chicago, Denver, Houston, Los Angeles, New York, Philadelphia, Pittsburgh, Portland, San Francisco, Seattle, Tacoma, Bridgeport, Conn.

# Ore goes up, costs go down with conveyor idlers on TIMKEN® bearings

THE 956-ft. conveyor shown below lifts crushed iron ore 280 feet from pit floor to loading bins at the Webb Mine in the Mesabi Range. To keep power and maintenance costs down, operators of this mine use Rex idlers equipped with Timken® tapered roller bearings.

Because Timken bearings practically eliminate friction, idlers roll easily under the heaviest loads. There is less drag on the belt and a consequent saving in power costs.

Since Timken bearings keep idlers rigidly aligned, there is less chance of belt scuffing and wear. Belts last longer, maintenance expense is reduced because Timken bearings require minimum attention for lubrication. And since Timken bearings permit the use of efficient closures, lubricant stays *in*—dust and water stay *out*.

Due to the line contact between the rolls and races, Timken bearings have extra load carrying capacity. Their tapered construction enables them to handle both thrust and radial loads in any combination.

No matter what equipment you use or make, the trade-mark "Timken" on the bearings is an assurance of dependable performance, long life and continuous trouble-free operation. The Timken Roller Bearing Company, Canton 6, Ohio. Cable address: "TIMROSCO".

*This symbol on a product means its bearings are the best.*

Here's how **REX CONVEYOR IDLERS,** made by the Chain Belt Company of Milwaukee, are equipped with Timken roller bearings for heavy duty operation.

**NEW TIMKEN BEARING CUTS RUN-OUT IN HALF!**

Until now, the Timken "Zero" bearing has been the last word in bearing accuracy. Now Timken offers industry the "Double-Zero" bearing—*twice as accurate* as the "Zero"! Maximum run-out of the new "Double-Zero" bearing is only 75 millionths of an inch—*half* the 150 millionths run-out of the "Zero" bearing.

What an opportunity for manufacturers of machines where extreme accuracy is essential! Available in standard single row types, up to 10" O.D. Write for further information.

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***TAPERED ROLLER BEARINGS***

TIMKEN 1899 50 1949 YEARS

NOT JUST A BALL ○ NOT JUST A ROLLER ▭ THE TIMKEN TAPERED ROLLER ▭ BEARING TAKES RADIAL ↕ AND THRUST ◎ LOADS OR ANY COMBINATION ✳